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CHEMICAL NOTES ON SOME SCROPHULARIACEÆ.

BY FERDINAND F. MAYER.

This interesting family has lately again been drawn into notice by the identification of *melampyrite*, the saccharine principle of *Melampyrum*, *Scrophularia* and *Rhinanthus*, with Laurent's *dulcite*, by L. Gilmer,* and the establishment of the systematic formula for this sugar by Erlenmeyer and Wanklyn,† who have proved it to be an alcohol of hexylen.

Besides, what is more important from a medical point of view, the discovery of the principle to which *Digitalis purpurea* mainly owes its value, of a volatile alkaloid, has been announced by Engelhardt,‡ whose detailed accounts are yet to be forthcoming.

As I have myself before noticed this alkaloid during my investigations of narcotic preparations, however, without having been able, from want of time and material, to isolate it as has been accomplished by Engelhardt, and without wishing to anticipate the results of that chemist, I may be permitted to give here some notes of my own experience on the properties of some proximate principles of this plant, and of *Veronica* and *Gratiola officinalis*, in connection with a preliminary investigation of one of our indigenous medicinal plants, the *Veronica Virginica* of Linné, or *Leptandra Virginica* of Nuttall.

After a general examination of the Eclectic resinoid Leptan-

* Ann. Chem. Pharm. cxxiii. 372.

† Journ. Chem. Society, Nov. and Dec., 1862.

‡ Neues Jahrb. für d. Pharm. Januar, 1863, from Zeitschrift für Chemie und Pharm., 1862, p. 722.

drin had satisfied me that the plant from which it is derived, besides a volatile alkaloid contained a copulated body, agreeing in its properties partly with Rochleder's saponin and caincin,* so far as made known, and with Quevenne's *acide polygalique modifiée* † and Homolle's digitaline as regards precipitability by gallo-tannic acid: I met with a suggestion to the same intent on receiving Prof. Rochleder's last paper on the seeds of *Æsculus Hippocastanum* ‡ which had been in course of preparation since 1852.

This paper closes with the following remarks: "There is but little room for doubt but what æscigenin, or compounds of the same, may likewise occur in other plants. From among the class of bodies bearing resemblance to it, I would here only refer to cyclamin, the composition of which closely agrees with that of æscinic acid. . . . The digitaliretin of Walz, for which he has given the formula $C_{33}H_{26}O_9$, requiring 72.2 p. c. C, and 9.8 p. c. H, according to his description also closely resembles our æscigenin. The formula of the latter, before being dried at 130° C, is $C_{48}H_{39}O_9$ (digitaliretin multiplied by $\frac{3}{2}$). The digitaliretin described by Kosmann, for which he has calculated the formula $C_{30}H_{25}O_{10}$, has 63.15 p. c. C and 8.77 H, which very nearly agrees with the composition of argyræscetin. The other product analyzed by Kosmann (*la digitaline*), for which he has given the formula $C_{34}H_{46}O_{20}$, approaches near enough in its composition (53.2 p. c. C. and 7.4 p. c. H) to some of the sub-

* Ber. Wien. Akad. Band xlv. Neues Repert. f. Pharm. Band xi. 376.

† Journ. de Pharm. Juin, 1837. Handwörterbuch der Chemie, vi. 621.

‡ Ber. Wien. Akad. Band xlv. April, 1862. Chem. Centralblatt, 1863. January 14th and 21st. These seeds contain a saponaceous but crystallizable bitter principle, *argyræscin* (Fremy's bitter principle,) an amorphous substance, *aphrodæscin* (Fremy's saponin and æsculinic acid.) Acids split the former into *argyræscetin* and sugar, and afterwards, as do alkalies, into the same products as those produced from *aphrodæscin*, viz.: *æscinic acid*, *telæscin* and *æscigenin*, the two last named supposed to be identical with kinovin and (Hlasiwetz and Gilm's) kinovic acid. A secondary product of the action of alkalies on *argyræscin*, besides a saccharide, is propionic acid, on *aphrodæscin*, butyric acid. There is also generally present in small quantities another glucoside, which, by the treatment with alkalies, yields *valerianic acid*. The yellow coloring matter gives *quercetin*.

stances lately described by the author. . . . Nor is it necessary to refer any further at this time to several substances described by Walz, the composition of which, as well as the properties, indicate a connection with the substances described by me."
—(Rochleder.)

On comparing the analyses of Walz's bitter principles of the Scrophulariaceæ, this similarity is very striking. As to Kosmann's digitaline, its centesimal composition is the same as that adopted by Rochleder for saponin, yet there are certainly very decided differences in their physical and chemical properties; on the other hand, it fully agrees with the first analysis of gratosolin published by Walz.*

But it would also appear as understood from the above quotation, that the precipitation by tannin, first noticed by Gehlen as a property of the impure saponaceous principle of senega, and by Quevenne in his modified polygalic acid,—and which Homolle, Eug. Marchand, and Walz have employed in obtaining the non-volatile bitter principles of the Scrophulariaceæ,—likewise belongs to the secondary products described by Prof. Rochleder, though no mention is made of it in the papers at my disposition.

Under the same head we most likely will have to class the sal-separin of Thubeuf, and the similacin of Folchi (Palotta's pariglin, Batka's parilic acid,) the similarity of which to kinovin was pointed out by Prof. Buchner, Jr., and also the smilachin (from *Smilax China*, L.) of Reinsch.

Here also belongs the acrimonious principle of *ginseng*, the root of *Panax quinquefolium* to which the panaquilon of Garrigues appears to stand in a similar simple relation, as that of sapogenin to saponin.

There are very many medicinal plants which owe the principal part of their therapeutical effect to the presence of substances not azotised, which are precipitable by gallo-tannic acid, while others contain similar principles which by the action of acids or alkalies can be so far changed as to show the same behaviour. But whether this reaction may eventually be used

* *Jahresbericht für die Chemie*, 1851. *Buchner's Report*, Bd. cix.
p. 12.

to determine the relative value of such plants, can as yet not be decided.

The few experiments about to be detailed were undertaken principally to gain certainty upon two points,—the presence of a saponaceous principle, and the origin of the substances precipitable by tannin.

It will not be uninteresting to premise, as far as pertinent, the chemical history of this family. As a matter of course, the experiments appended have as yet no pretension to scientific value.**

Digitalis purpurea.—The presence of an alkaloid in this plant has before been announced by Lancelot,* Radig,† and Watson J. Welding.‡

But these statements, on examination, appear very doubtful. Otherwise the analysis by Radig, of which I can only quote the tabulated results, appears entitled to more credit, since he has eliminated two substances really existing in the plant, though altogether ignored by subsequent writers. These substances are a bitter principle, *picrin*, which is removed from the infusion by means of ether, and *scaptin*,|| a substance soluble in water, possessing the acrid taste of saponin. In case that future experiments should establish the identity of constituents in the plants of this family, it would much lighten its literature, if the name *scaptin* were retained for the saponaceous principle.

Dulong, as quoted by Donovan and Homolle, likewise obtained a bitter extractive, soluble in water and alcohol, but little only in ether.

From Homolle's prize essay § dates the repute of the car-

* Ann. Chem. Pharm. xii, 251, 1833. Handwörter, 1st ed. ii. p. 603.

† Pharm. Centralblatt, 1835, No. 14. Pereira, Elements, ii. p. 457.

‡ Thesis before the Philadelphia College of Pharmacy. Am. Journ. Pharm. v. 89.

** [For the previous history compare a paper by Dr. Donovan from *Dublin Journal of Med. Sciences*, May, 1839, in Am. Journ. xi. p. 204, and by MM. Brault and Poggiale from *Journal de Pharmacie* in Am. Journ. Pharm. vii. p. 218.]

|| From *scrapo*, to scrape.

‡ Journal de Pharm., Janvier, 1845. An abstract from the Chemical Gazette, in Am. Journ. Pharm., xvii. 97 and 104.

bohydrates precipitated by tannin, which are now employed in medicine as digitaline. As originally prepared, this amorphous substance was very difficultly soluble in water, still more so in ether, somewhat more soluble in ether-alcohol, but readily in alcohol. As distinctive test, Homolle mentions the action of strong hydrochloric acid on this substance, which dissolves rapidly into a yellowish liquid, and this, after a few seconds, turns of an emerald color, gradually growing darker. Its aqueous solution was not precipitated by subacetate of lead, but by tannin.

Soon after followed some papers by Morin,* Kosmann,† and especially those of Walz,‡ who separated the body precipitated by tannin from a neutral solution into three substances: *digitalin*, little soluble in water; the alcoholic solution congeals on evaporation; but neither this substance nor the two others are colored by hydrochloric acid; *digitasolin*, more soluble in water, little in ether; and *digitalicrin*, insoluble in water, soluble in ether.

In 1851, appeared the essay of Homolle and Quevenne || in which they describe a number of substances of the same kind, but under different names, viz.: *la digitaline* (Walz's digitalin,) *le digitalin* (digitasolin,) *digitalose* (digitalicrin,) and *digitalide*. They insist besides on the green coloration with hydrochloric acid.

Immediately after, A. Buchner, Sr., published a paper on the seeds of *Digitalis* § from which he obtained a drying oil, and Homolle's original digitaline; at least this substance gave to him a green color with hydrochloric acid on the application of heat. He mentions that pure digitalin is precipitated neither

* Am. Journ. Pharm. xvii. 181, from Journ. de Pharmacie, Avril, 1845.

† Journ. des. Connaiss. Méd. Nov. 1845. Buchner's Report, xcii. 348. Handwörter, 2d ed. ii. 3 p. 462.

‡ Jahresbericht d. Chem. for 1847, p. 646, and for 1851, p. 567. Wittstein's Vierteljahr, x. 234.

|| Mémoires sur la Digitaline, par MM. Homolle et Quevenne. Rapports faits à l' Académie Nationale de Méd., le 8 Janvier 1850, et le 4 Fevrier, 1851, par MM. Rayer, Soubeiran et Bouillard.

¶ Report f. die Pharm. cix. p. 38. Extract from Chem. Gazette, in Am. Journ. Pharm. xxiv. p. 153.

by tannin nor by sulphuric acid, as formerly stated by L. A. Buchner, Jr., and others; that the precipitate with tannin is soluble in hot water, from which it again separates on cooling, and that the alcoholic extract dissolved in water, after precipitation with subacetate of lead and removal of the excess of lead by sulphuric acid, has, before the addition of tannin, the property of frothing strongly when shaken.

The first analysis of digitalin by Walz and that by Delffs,* agrees pretty closely with the formula of Rochleder's telæscin, that of digitasolin with one of the products intermediary between aescinic acid and telæscin, and that of digitalicrin with the formulæ of some products intermediate between telæscin and aescigenin.

Ludwig† and Delffs noticed the production from digitalin by the action of dilute mineral acids in the heat, of some substance capable of reducing suboxyd of copper from Fehling's solution.

In 1858, Walz revised‡ the results of his former researches, and remodelled among other the nomenclature of the substances precipitated by tannin. He designates as *digitalin* the former digitasolin, as *digitaletin*, the former digitalin, and as *digitalacrin* that portion of ordinary medicinal digitaline which is soluble in ether. Both the new digitalin and digitaletin by boiling with dilute acids are split into a sugar and *digitaliretin*, soluble in ether, and *para-digitaletin*, insoluble in ether. Digitalacrin is likewise a complex mixture. Walz found in it, besides fatty matter, two acrid resins, one soluble, the other insoluble in ammonia; they both dissolve in warm hydrochloric acid with an olive-green color.

Kosmann in 1860,|| without reference to the previous researches of Walz, gave the division of (la) digitaline by dilute sulphuric acid into fermentable sugar and *digitalirétine*, a substance differing from that to which the same name had previously been given by Walz. By the action of caustic soda,

* Jahresber. d. Ch. for 1858. Archiv der Pharm. Bd. cxlv. p. 330.

† Jahresber. d. Ch. for 1855.

‡ Jahresber. d. Ch. f. 1858. Vierteljahresschrift f. Pharm. x. 234.

|| Journ. de Pharmacie, [3] Tome xxxviii. p. 5. Pharm. Journ. Transact. [2] vol. ii. No. 3. Am. Journ. Pharm. vol. xxxiii. p. 69.

digitaline is converted into *acide digitalinique*, which is separated in a solid form by neutralizing the alkaline mixture. The acid filtrate from this precipitate gives, with nitrate of silver, a white flocculent precipitate, which turns black in the light; with a solution of copper a sky blue precipitate, and (a white) one with neutral acetate of lead. This *acide digitalinique* has many points of resemblance in common with Morin's *acide digitalique*.

Since then Dr. Homolle has reopened the question, to which constituent of the leaves belonged their peculiar therapeutical effect. From his latest experiments* he concludes that the most active ingredient is a fatty substance extractable by ether. He compares it with the *acide digitoleique*, which Kosmann, in 1846, obtained from the precipitate with subacetate of lead by extraction with ether, very likely the same as the *digitaloin* or the *digitaloic acid* of Walz.†

The peculiar odor of this and other plants of the same family, is due in part to the presence of a free volatile acid, Morin's *antirrhinic acid*,‡ partly to a stearopten (Welding), Walz's *digitalosmin*.||

Walz has examined the acid distillates from *Digitalis purpurea*, and *D. lutea*, from *Gratiola officinalis*, *Antirrhinum majus*, *A. cymbalaria*, *Linaria vulgaris*, *Scrophularia nodosa*, *S. aquatica*. They appear to have been in nearly all cases mixtures of formic, acetic, propionic, butyric and valerianic acids.

From the two species of *Scrophularia*, Walz obtained substances analogous to those derived from *Digitalis* and *Gratiola*, viz.: *Scrophularin*, α and β ; *scrophularosmin*, etc.,§ and from the others mentioned above,|| the bitter principles *antirrin*, *antiresin*, *antirracrin*, *cymbalarin*, *linariin*, an odorous stearopten *antirroemin*, and a peculiar volatile acid, *antyrhinic acid*, from *Linaria vulgaris*, DeC. From the yellow flowers of the last

* Archives Génér. 5 Série, xviii. Juillet, 1861. Cannstatt's Jahressb. f. 1861, p. 260.

† Gmelin's Handbook, Cavend. ed. vol. xiv. p. 530.

‡ Journ. de Pharm., Avril, 1845. Handwörterb. 2d. ed. ii. 1, p. 145

|| Gmelin's Handbook, vol. xiv. p. 533.

§ N. Jahrbuch f. d. Pharm. Band xxvi. p. 296; xxvii. p. 12.

|| N. Jahrbuch f. d. Pharm. 1853.

named plant, which are occasionally used as a yellow dye, Riegel* has obtained a crystalline yellow coloring principle, *anthokirrin*, which appears to stand in a close relation to one of the yellow principles yielding quercetin.

My experiments were made with portions of the dried plants, and, the object in view having been explained, will be given so far as successful.

The three substances discovered by Radig in *Digitalis* can be separated in the following manner to better advantage:

An alcoholic fluid extract of the leaves, left to spontaneous evaporation until reduced to the consistence of mellago, then placed for three days on a dialyser floating on water, yields with it a clear brownish-yellow solution of acid reaction, from which the three substances can be precipitated by tannin.

They are, however, obtained separately by adding to the liquid asolution of iodohydrargyrate of potassium, neutralizing the free acid cautiously with caustic alkali, and again slightly acidulating the liquid with oxalic acid. The precipitate which now appears, contains all the alkaloid. It is necessary to remove the free volatile acid by combining it with fixed alkali, on account of the solubility of the iodohydrargyrate of the alkaloids in volatile organic acids.

The slightly acid liquid, after the removal of the alkaloid gives with tannin a curdy, afterwards resinous, precipitate. Dissolved in dilute alcohol and decomposed by acetate of lead, the solution, after being freed from excess of lead by sulphur-etched hydrogen, and reduced by evaporation, yields a pale yellowish-green resin, which gives a green solution with hydrochloric acid; this is again rendered turbid by water.

A third precipitate is caused by neutralizing the filtrate from the second precipitate and adding more tannic acid. It possesses the properties mentioned by Homolle and Buchner, and yields a glucoside, or mixture of glucosides (digitaline).

The ordinary digitaline and that obtained in this manner, are to some extent soluble in water. Their solution froths strongly when shaken, and gives a faint precipitation with subacetate of lead. The substance to which this frothing is due, is carried

* *Pharm. Centralblatt*, 1843, p. 454.

down from all watery solutions with precipitates; still it is present only in small quantity, at least in the dried leaves.

The alcoholic extract, dialysed or diluted with water, was precipitated with neutral acetate of lead, the filtrate again precipitated with subacetate of lead, and the last precipitate suspended in dilute alcohol and decomposed by sulphuretted hydrogen. The resulting liquid after boiling, evaporating and filtering, gave, upon being shaken up with crystals of caustic baryta, a yellowish-white precipitate, precisely like similar solutions of saponin; the filtrate from this compound of baryta, after removing the excess of baryta by carbonic acid gas, gave the usual precipitate with tannin. But the baryta compound on the filter undergoes a change while it is being treated with baryta-water for the purpose of purification, and it is finally no longer soluble either in water or alcohol.

The precipitate produced with acetate of lead contains a yellow coloring matter, from which, however, no quercetin could be obtained.

A sufficient quantity of the alkaloid for examination was procured from the alcoholic fluid extract as follows: The fluid extract reduced to the consistence of soft extract by spontaneous evaporation, was treated with ordinary water of ammonia, in which it dissolves almost completely. This solution was supersaturated with sulphuric acid, care being taken to avoid a rise of temperature; the brown colored, acid liquid filtered from precipitated resin, was then again neutralized, placed in a flask with sufficient chloroform and a very small quantity of caustic soda lye, and then well agitated; the same quantity of chloroform being used subsequently for the extraction of several portions of the extract. In this manner a more concentrated solution is obtained than by direct treatment of the extract, and much of the loss caused by distillation of the plant with a fixed alkali is avoided.

The chloroformic solution, besides alkaloid, contains a brownish-green, fatty resin, of a nauseous odor, which gives an emerald-colored solution with acids.

Falken's test for determining the efficacy of the leaves* appears

* Am. Journ. Pharm. xviii p. 160.

to be independent from the presence of the alkaloid. The latter at least gives no precipitate with yellow prussiate, while the watery solution of the extract of *Digitalis*, as well as of *Leptandra* is precipitated even after the removal of the alkaloid.

Leptandra Virginica, Nuttall, (*Veronica Virginica*, L., *Eustachya*, Rafinesque) has been before examined by Mr. Wayne.* He evaporated the alcoholic tincture; and obtained the so-called resinoid leptandrin by the addition of water. The filtrate precipitated by subacetate of lead, and freed from excess of the metal, left a bitter substance soluble in water and in ether, which is taken up by charcoal. The alcoholic decoction from the latter, leaves on evaporation a green substance possessing the nauseous taste of the root, and it yields to ether a crystallizable substance and a green resinous body, both of a bitter taste.

Somewhat later,† Mr. Wayne examined a saccharine principle obtained from the liquor after the precipitation of the resinoid, which proved to be mannite.

The root, as well as the extract and other of its preparations, possess a peculiar almond odor. I noticed that this is more strongly developed when an alcoholic tincture, mixed with some acid, is boiled in an open capsule. Distilled with dilute sulphuric acid, the root yields an acid distillate of a very unpleasant odor, and which contains traces of formic acid.

The various preparations treated with acids for some time in the heat, turn into dark, green-colored resins. The acid solution from the resinoid contains an appreciable amount of a volatile alkaloid, agreeing so far as it appears in its properties with that of *Digitalis*. It is obtained from the alcoholic fluid extract by treatment with ammonia as before described.

A decoction with 90 p. c. alcohol, deposits on standing, only a very minute quantity of indifferent matter. Ether separates from it after some time a few granular crystals, soluble in water, (mannite?)

This tincture, evaporated to expel the alcohol, then diluted with water, was precipitated first with acetate, then with subacetate of lead, and the filtrate from the last precipitate freed

* Proceed. Amer. Pharm. Association, 1856, p. 34.

† Am. Journ. Pharm., vol. xxxi, p. 557.

from lead. After its purification and neutralization it yields a greyish white precipitate with tannin, from which a mixture of glucosides is obtained, precisely as in the case of *digitalis*, but not nearly as bitter, soluble in alcohol, but only partially soluble in water and in ether.

The precipitate with acetate of lead, treated with dilute acetic acid, yields in solution a very small quantity of citrate of lead.

The precipitate with subacetate of lead, was of a pale yellow color. It was treated as nearly as possible by the methods described in the last publications of Prof. Rochleider, but yielded only one saponaceous principle. This was obtained in small quantity, but tolerably pure, by decomposing the precipitate in the manner described above, suspended in dilute alcohol by a current of sulphuretted hydrogen. The pale yellow solution which resulted, was freed from sulphuretted hydrogen and alcohol by boiling, and after filtering treated with crystals of barya; the greenish yellow precipitate was collected on a filter and washed with cold saturated barya water. The filter was then transferred to a flask with water, which was kept boiling, while a current of carbonic acid was conducted through it. The solution, filtered from the carbonate of barya, yields on evaporation the saponaceous principle as an amorphous, more or less colored mass, closely resembling senegin in its properties, but more readily decomposed by alkalies.

The filtrate from the precipitate with barya gives apparently the same precipitate with tannin, as do the products of the action of acids and alkalies, on this glucoside of *Leptandra*.

The watery solution of the alcoholic extract, when freed from alkaloid by means of iodohydrargyrate of potassium, yields but a slight precipitate with tannin until neutralized; but in either case the whole precipitate is soluble in water.

In order to ascertain the presence of this primary glucoside in some other officinal species, and if possible to find a more available and cheaper source for the same, I examined likewise some of the dried herb of *Veronica officinalis* and of *Gratiola officinalis*.

Veronica officinalis gathered at the flowering period has been examined by Enz,* who found in the fresh juice, and in an ex-

* *Vierteljahrsschrift f. Ph.* vii. p. 182.

tract from the herb gathered at maturity, a bitter principle soluble in water and alcohol, but scarcely in ether, precipitable by salts of lead but not by tannin; an acrid principle, and a red coloring matter, all contained in the precipitate with neutral acetate of lead, together with malic, tartaric, and citric acids; also acetic and lactic acids and a tannin, striking a green color with iron, a crystallizable, apparently fatty acid, soluble in alcohol and ether, a soft, dark-green, bitter resin, and mannite.

The dry herb which I employed was evidently much changed by keeping. It yielded a large quantity of a moderately bitter extract, which it was necessary to treat with sulphate of soda, to obtain a clear solution. The brown liquid containing the soda salt in solution was separated from the brown tarry precipitate, and reduced to dryness. It was then treated with strong alcohol, and the alcoholic extract evaporated, and re-dissolved in water.

This solution gave only very faint, though indubitable indications of the presence of an alkaloid, the precipitate of iodohydargyrate requiring a very long time to settle. The yield of saponaceous principle and precipitate with tannin was comparatively very small.

A more abundant yield is procurable from *Gratiola officinalis*, a drastic plant, which furnishes an intensely bitter extract. This plant has been examined by Vauquelin,* by Eugene Marchand,† and repeatedly by Walz.‡

Marchand noticed the precipitation of a bitter principle from the neutral solution by tannin; the glucosides examined by Walz are all obtained in the same manner.

From this plant the saponaceous principle can be obtained in a tolerable state of purity by precipitating the aqueous solution of the residue left on evaporating a tincture prepared with boiling alcohol of 80 p. c. This is treated with animal charcoal, and the decolorized liquid precipitated by baryta, as before described.

New York, June, 1863.

* *Bulletin de Pharm.* Tome i, p. 481, (1809.)

† *From Journ. de Pharm.* in *Am. Journ. Pharm.* xviii. p. 281.

‡ *Jahresb. d. Ch. f.* 1851, p. 569, and for 1858, p. 518. *Vierteljahrsschrift f. Pharm.* viii. p. 7. *Am. Journ. Pharm.* xxxi. 340.

NOTES ON THE ALKALOIDS OF MENISPERMUM CANADENSE.

BY JOHN M. MAISCH.

If we take into consideration the similarity of medical properties of some plants, it is natural to suppose that their proximate constituents are, if not identical, at least closely allied to each other. In plants belonging to the same natural order, or to the same genus, this cannot appear strange, since quite a number of our most active alkaloids, for instance, have been found in more than one, some in numerous, species of the same order.

Many of the organic acids have been found widely distributed through the vegetable world, even those acids which have been considered characteristic of certain genera, like kinic acid for the genus *Cinchona*, appear to be common products of vegetable life, not confined to a single genus or family or allied families, but formed within the cells of plants having no botanical relation whatever. Alkaloids have always been considered as peculiar to a species, or at least as not to wander beyond the limits of the order. When caffeine was proved to be identical with theina, psoraleina and guaranina, it was undoubtedly a step which upset some of the ideas, I might say the notions, formed of this class of bodies.

The discovery of berberina not only in different families, but in many of the species belonging to these families, (see the interesting paper of Prof. F. F. Mayer, page 97,) is of still greater importance, as all these plants possess decided tonic properties, with a peculiar action on the liver; and because, in perhaps all the species, the berberina is accompanied by a white alkaloid, sometimes the latter, in other instances the former, predominating.

The properties, together with some physical appearances, led me first to suppose the presence of berberina, and afterwards to satisfy myself of the presence of an alkaloid in the roots of some plants in which it has since been discovered. One of these plants is *Menispermum Canadense*, the long rhizoma of which is used as a tonic, and with its peculiar yellow color suggested the presence of berberina, which has previously been discovered in other *Menispermaceæ*.

More than a year ago, I commenced the analysis of this drug, but my other engagements not only forced me to give up the investigation of the other constituents, but have also delayed my examination of the alkaloids, so that I think it better to state the few facts proved so far, and to promise a fuller report as soon as my time shall allow to complete the researches.

The rhizoma contains, contrary to my expectations, only a small proportion of berberina, but a larger quantity of a white alkaloid. The alkaloids may be obtained in an impure state by any of the simple processes for this class of bodies. The following I have found to be the readiest method:

The powder is exhausted with alcohol, the menstruum evaporated, the extract taken up with water and filtered from the resin. The solution is of a yellow color, so that I expected to find a considerable quantity of berberina. But when the liquid is concentrated and mixed with an excess of muriatic acid, but little muriate of berberina is precipitated, and the mother liquor retains its yellow color. This liquid yields with carbonate of soda a bulky precipitate, but the color does not entirely disappear thereby; probably the color of the bark is, to a considerable degree, due to some acid.

If the precipitate is redissolved in muriatic acid, and allowed to evaporate spontaneously, either from an aqueous or alcoholic solution, no crystals appear, but a brownish resinlike mass is left behind. If the alcoholic solution is mixed with ether, a white turbidity, and finally a white precipitate occurs, which retains its color under the liquid in stoppered bottles, but turns brown on drying. This salt contains a white alkaloid, which may be obtained by decomposing its aqueous solution with ammonia and shaking it with ether; on the spontaneous evaporation of the ether, the alkaloid remains behind in the form of a white pulverulent mass, which is generally tinged yellowish brown at the edges. By redissolving this colored portion in muriatic acid, and treating it as before, it will likewise be obtained in a pure white condition.

Besides its solubility in acids, and its precipitability from these solutions by alkalies, the following behavior characterizes this body as a vegetable alkali: It turns tumeric paper brown, and restores the color of reddened litmus; its solutions are pre-

cipitated by tannin, phospho-molybdic acid and iodohydargyrate of potassium. The alkaloid is soluble in ether, alcohol and in much water.

Philadelphia, June, 1863.

NOTE ON PODOPHYLLIN.

BY JOHN M. MAISCH.

The resin of mandrake, as it is met with in commerce, is very variable in appearance: its composition varies in accordance with the mode of its preparation.

Prof. F. F. Mayer mentions in his paper published on page 97, of the present volume, that *podophyllum* contains berberina. I can corroborate this statement, having prepared it from the mother liquor, from which the resin has subsided.

When the alcoholic tincture is evaporated to a syrupy consistence, and poured with continual agitation into a large quantity of cold water, the sediment after drying will be found of a light-brown color, and to contain the above alkaloid, which may be removed by repeated washings with hot water, during which process, however, the preparation darkens considerably. If the syrupy residue is precipitated by hot water, the resin will separate and fuse at once into a dark-brown cake, which is almost free of berberina, a small portion dissolved in the mother liquor being mechanically enclosed by it.

The mother liquor has an acid reaction, and from it the berberina may be obtained by concentrating it and precipitating muriate of berberina by an excess of muriatic acid. The mother liquor from this precipitation is still of a yellow color, which is due probably to some coloring matter of an acid nature. The muriate of berberina may be purified in the usual manner by dissolving in alcohol.

The resin separating from hot water, settles pretty rapidly, but from cold water it subsides with difficulty, because, most likely, of the slow separation of the native salt of berberina; but if muriatic acid be added to a certain extent, the liquor becomes clear in a short time, since the salts of this vegetable alkali are insoluble in mineral acids. Resin of *podophyllum* prepared in this way is of a pale greenish-brown color.

It is obvious then from these statements that the so-called podophyllin may, according to the mode of its preparation, contain no alkaloid, a small portion of the native salt, or a larger proportion of muriate of berberina, and that its action upon the animal economy must be modified at least to a certain extent.

I am not aware of any physiological experiments instituted with berberina or any of its chemical combinations. But some of the drugs in which it occurs, are still highly prized as tonics, and are regarded as possessing special action upon the liver; this is, among others, the case with the bark of berberis and with colombo. Podophyllum has long been regarded as a vegetable substitute, to a certain extent, for calomel; and the question arises, whether the pure resin has any action at all upon the liver, or whether it is merely cathartic, being directed to that organ only when combined with berberina? This is a subject requiring investigation by the physiologist; but, to be of any value, the experiments ought to be conducted with the pure principles, and not with a mixture of known and unknown constituents, even if this was commonly called, after the fashion of the eclectics, by a name rightfully belonging to a pure chemical principle.

In the preparation of the resin of podophyllum, by precipitation with water, a considerable quantity of muriate of berberina may afterwards be obtained, and this salt should be collected, because it undoubtedly possesses some therapeutic value. It will be remembered that muriate of berberina is identical with the so-called hydrastine of the eclectics.

Philadelphia, June, 1863.

HISTORY OF THE ORGANIC RADICALS.

By M. AUGUSTE CAHOURS.

A Lecture delivered before the Chemical Society of Paris, March 30th, 1861.

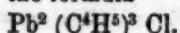
Translated from the French, by W. S. W. RUSCHENBERGER, M. D., U. S. N.

(Concluded from page 221.)

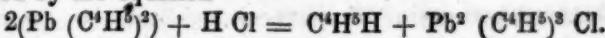
Plumbodiethyl representing the limit of saturation of the compounds which lead forms, we are not surprised to learn that this product like tetrastannethyl, is incapable of uniting with oxygen, chlorine, iodine, &c.

If we warm this liquid with a concentrated solution of chlo-

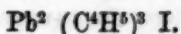
rohydric gas, an inflammable gas is disengaged, and on cooling we see deposited beautiful satiny needles, the composition of which is represented by the formula



The reaction which gives rise to this product may be expressed by the equation



Iodine gives with plumbodiethyl an analogous product represented by the formula

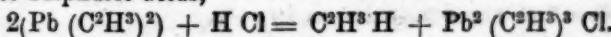


Iodide of ethyl is separated at the same time.

When we employ an excess of iodine we obtain iodide of ethyl and iodide of lead.

I am satisfied for my part that in replacing zinc ethyl by zinc methyl we obtain plumbodimethyl which is formed in like manner by causing the iodide of methyl to act upon an alloy formed of five parts of lead with one of sodium ; but the first method is much preferable.

In this way we obtain a very mobile and colorless liquid whose strong and peculiar odor reminds us of camphor and mouldiness. Incapable of uniting either with oxygen or chlorine or iodine, this compound separates in the manner of its ethylated homologue. Similar results are observed when we employ chlorohydric or sulphuric acids,



I merely mention the ethylated and methylated compounds of mercury which Messrs. Frankland, Strecker and Buckton have so completely studied.

A profound examination of these compounds would lead us to conclusions entirely similar to those which we have deduced from the study of the preceding combinations.

Not to consume more of your time, and to demonstrate to you by a last illustration still more conclusive than the preceding, that bodies which act as radicals are complex substances in which saturation is not satisfied, I am about to submit a summary description of the ethylate and methylate compounds formed by bodies of the family of azote, or nitrogen, which will afford us results of the highest interest.

The different simple bodies which constitute this family have a

great tendency to form the two groups



and



Ammonia belongs to the first group, as well as the gases designated under the names phosphuretted, arseniuretted, antimoniuuretted hydrogen. But if these compounds are represented by parallel formulæ, it must be admitted that we do not observe much analogy in their chemical actions; thus, while ammonia unites directly with the strongest acids, and saturates them completely, phosphuretted hydrogen combines only with some acids, and forms very unstable compounds, and the corresponding compounds of arsenic and antimony are entirely incapable of forming saline compounds. But if in those hydrogen compounds we replace all the hydrogen by equivalent proportions of ethyl or of methyl, we obtain the products



which present much more marked analogies.

The addition of a new equivalent of ethyl gives the products



which this time present such resemblances that the history of these different products is found to be based upon one of them.

The tendency which these different products have to fix an equivalent of oxygen, of chlorine, of iodine, &c. to beget compounds which enter into the group



is such that it is necessary to interpose quite energetic forces to destroy the equilibrium of these compounds; thus, the chlorides, bromides, iodides, &c.,



would not be decomposed by a boiling and concentrated ley of caustic potassa.

The corresponding oxides



all possess the most decided alkalinity, and in this respect rival potassa and soda. Like the latter, they restore to blue the reddened tincture of tournsol, disorganize the skin, saturate the most energetic acids, saponify fatty bodies, and behave like

them towards metallic salts. Moreover, compounds formed by these oxides are isomorphous with corresponding compounds of potassium and sodium; it is the same with chlorides, iodides, &c. These analogies are so striking that the most prominent features presented in the history of alkaline metals may be followed in these compounds.

Among these curious compounds, even a very succinct analysis of which would carry me too far, I beg leave to select those referable to arsenic, which I have most especially studied; what I shall say of them may be applied, with slight modifications, to the others.

It is easy to demonstrate that arsenic placed in suitable conditions is susceptible of uniting successively with 1, 2, 3, 4 molecules of methyl to form compounds,

As Me, As Me², As Me³, As Me⁴,
which, not having attained the limit of saturation

As X⁵,

are consequently susceptible of uniting with 4, 3, 2, 1, equivalents of oxygen, chlorine, iodine or sulphur, to finally yield compounds at saturation, the physiognomy of which will be very different. Thus if we consider the two extremes we shall have

As Me O⁴ As Me⁴ O.

The first presenting the characters of an energetic acid, while the second offers us such analogy of properties with the alkaline bases that one might be tempted to confound it with potassa or soda.

These different combinations of methyl with arsenic are formed with the greatest facility in the reciprocal action of iodide of methyl and alkaline arseniurets. If we pour iodide of methyl, a little at a time, upon the arseniuret of potassium reduced to powder, and place it in a small globe previously filled with carbonic acid, we immediately perceive a very vivid action, which is manifested by a marked elevation of temperature. The moment this ceases to be produced we distill the mass in a current of inert gas, and collect a mixture of these products, namely:

1st. As Me² arsenidimethyl (cacodyl.)

2d. As Me³ arsentrimethyl.

3d. As Me⁴ I, iodide of arsenimethylum.

The first term, which is nothing but the cacodyl of Bunsen, is easily obtained, as is known, by the distillation of a mixture of

arsenious acid and acetate of potassa entirely deprived of water. We can produce the last in considerable proportion and in an immediate manner by causing iodide of methyl to act on cacodyl; we thus obtain, by crystallization in alcohol, cubes of great beauty, which possess the most perfect resemblance to those of iodide of potassium. The distillation of this substance from fragments of solid potassa yields the intermediate term in a state of entire purity, so that by means of acetate of potassa, iodide of methyl and arsenious acid, we can obtain the three products with the greatest facility.

Up to the present time I have been unable to obtain either the term at saturation As Me^6 , or the group

As Me^4 ,

the analogue of ammonium, the existence of which we may suppose in the crystallized iodide which we have called iodide of arsenomethylum. But the action of iodide upon the compound

$\text{As Me}^4, \text{I}$,

that of chlorine upon the corresponding compound

$\text{As Me}^4, \text{Cl}$,

will afford us the most instructive results, entirely analogous to those which result from the action of these bodies upon distanmethyl or the iodide of sesquianmethyl, and while enabling us to comprehend the mechanism of the formation of products so varied, impart the most brilliant character of reality to the hypothesis which I announced at the commencement of this lecture on the constitution of organic radicles.

Potassium and sodium being susceptible of forming with iodide the compounds

KI and KI^3 ,

we should expect to see the iodides

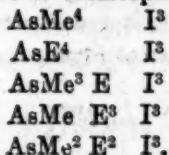
$\text{As E}^4 \text{I}$ $\text{Ph E}^4 \text{I}$, &c.

fix two new equivalents of iodine to form analogous compounds, which experiment proves in the most complete manner. Indeed, the researches of M. Veltzien have demonstrated to us the existence of the compounds

As Me^4	I^3
As E^4	I^3
$\text{As Me}^3 \text{ E}$	I^3
$\text{As Me} \text{ E}^3$	I^3

Arsenic has furnished me results exactly similar ; all these compounds crystallize in brown needles with metallic lustre, which remind us of the crystals of permanganate of potassa. They are generally slightly soluble in alcohol and in water : ether also dissolves them in slight proportion.

With arsenic I have realized the formation of the five following compounds, which are all isomorphous :



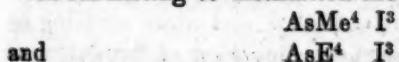
If it be now asked what action heat should exercise upon such compounds, the reply is easy. The affinity of iodine for methyl or ethyl should necessarily determine the separation of these products and bring us back inevitably to the group



with elimination of a portion of the methyl or of the ethyl under the form of iodide.

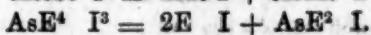
Experiment confirms this in the clearest manner.

In submitting to distillation the compounds

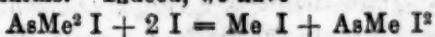


I have obtained in the first case, the iodide of cacodyl, and in the second, iodide of arsenediethyl or ethylic cacodyl ; the iodide of methyl or the iodide of ethyl is disengaged at the same time.

These reactions may be easily explained by means of the following equations :



Hence it is very probable that in causing two equivalents of iodine to act upon one equivalent of iodide of cacodyl, or three equivalents of iodine upon free cacodyl, so as to beget the tri-iodide, we would separate, under the influence of heat, one equivalent of methyl in the state of iodide, and at the same time would give rise to the iodide of arsenomonomethyl, which experiment fully confirms. Indeed, we have

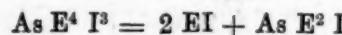


compounds which both belong to the group
 AsX^3 .

If we distil the di-iodide of arsenomonomethyl with two equivalents of iodine, or cause five equivalents of iodine to react on the cacodyl, we obtain in the end iodide of methyl and iodide of arsenic



The ethylic compounds of arsenic have furnished me, as might be anticipated, results entirely comparable to the preceding. Indeed we have

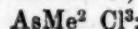
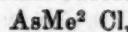


Starting from the ethylic or methyllic compound of arsenic which forms the upper term, we then obtain, by the action of increasing proportions of iodine, a series of compounds which all belong to the most stable group

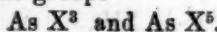


until, by a complete elimination of the alcoholic radical, we finally arrive at the iodide of arsenic, results which agree in such a striking manner with those presented by the ethyluret and methylurets of tin.

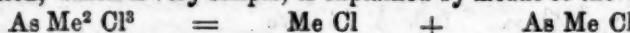
On the other hand we know, according to the admirable work of M. Baeyer, that when we cause chlorine in increasing quantity to act upon cacodyl, we obtain successively the products



which correspond to the groups



The first, which is volatile without decomposition, is the monochloride of cacodyl; if we attempt to distil the second, the equilibrium is not slow to be broken, chloride of methyl is disengaged in the gaseous form, and we obtain a product of more simple composition, which itself soon distils, and which is nothing else than the bichloride of arsenomonomethyl. The reaction, which is very simple, is explained by means of the equation



Trichloride of
 Cacodyl

Chloride of
 Methyl

Bichloride of
 Arsenomonomethyl.

The bichloride of arsenomonomethyl readily absorbs two new equivalents of chlorine, and yields a crystallized product corresponding to the group

As X^5 .

which is so unstable that gently warming it is sufficient to cause the separation of the last equivalent of chlorine, in the state of chloride at the same time that the arsenic passes to the condition of trichloride, in this way brought back to the group

As X^3 ,

which is the maximum of stability for the arsenic compounds.

I have satisfied myself that bromine, as analogies suggest, gives rise to perfectly similar results.

The clear reactions which the ethylic and methylic compounds of arsenic present, most strikingly confirm the views expressed by me at the commencement of this lecture, and which the study of the stannethyls had already clearly exposed, namely: that if bodies which act as radicals present, although complex, all the attributes of simple bodies playing sometimes the part of an electro-negative, and sometimes that of an electro-positive element, of supporter of combustion [comburant] or of combustible, it is that, on the one hand, they possess sufficient stability to enable us to engage them in combinations, and to return again, under the influence of certain forces, without destroying the equilibrium of their molecules, and on the other, the simple substances which compose them not having attained the term of saturation, tend to satisfy it when placed in suitable conditions.

Whenever then we establish contact between a compound formed by a simple body with methyl, or any one of its homologues corresponding to the condition of saturation, and the most electro-negative bodies such as oxygen, chlorine, iodine, &c., it is very evident that these will be incapable of adding to the group which we consider to form oxides, chlorides, iodides. We understand, on the contrary, that by a very simple phenomenon of double decomposition, we shall always be able to eliminate a part of the alcoholic radical in the form of oxide, chloride, &c., while an equivalent proportion of the simple body will take its place to form a product corresponding to the group which has served as the point of departure. Now the

chlorine or iodine introduced in this way into the compound, being susceptible of exchanging with different simple bodies, notably with oxygen, the oxygenated compound being able to unite different acids after the manner of metallic oxides, and to form different salts, we readily explain how the residue ought to present all the appearances of a true elementary substance.

GLEANINGS FROM THE FRENCH JOURNALS.

BY THE EDITOR.

Preparation of (solid) Citrate of Magnesia. By M. de Letter, of Brussels.—All the processes heretofore offered, have given a salt soluble at first, but which soon loses more or less of this character by a molecular change.

The following process has given to M. de Letter a citrate of magnesia completely soluble in cold water, and which preserves this quality indefinitely :

Take of Citric acid 20 parts.

Carbonate of magnesia 12 parts.

Pulverize the acid finely, and mix it intimately with the magnesia, also in fine powder. Abandon the mixture at the ordinary temperature during four or five days, or until it ceases to manifest any reaction when a particle is thrown into water. During the reaction, which slowly goes on, the powder swells up and gradually assumes the aspect of a spongy mass. This is dried at the temperature of 86° Fahr., pulverized, and the powder preserved in closely stopped vials.

According to M. de Letter, the solubility of this preparation is due to the absence of water, which in sufficient quantity favors the formation of an insoluble hydrate. The slowness of the operation is due to there being no vehicle to assist the reaction, (except the small amount of water of crystallization in the citric acid,) as well as to the low temperature.—*Journ. de Pharm., Mai, 1863, from Journ. d'Anvers.*

Formation of New Volatile Alkaloids during Putrefaction.—M. Calvert has found that when the gaseous products of the decomposition of flesh and fish are passed through chloride of platinum, a yellowish deposit is formed. Washed with water and

alcohol, and dried, this deposit was found to consist of carbon, hydrogen, nitrogen, and, most remarkable, of sulphur and phosphorus. These researches tend to prove that the noxious vapors disengaged during putrefaction, contain the nitrogen, sulphur and phosphorus of the animal matter, and that these elements are not set at liberty, as ammonia, and sulphuretted and phosphuretted hydrogen, which bodies were not met with in these experiments.—*Journ. de Chim. Méd.*, Mai, 1862.

Borate of Copper as a Substitute for Scheele's Green.—M. Bollay, (*Jour. de Chim. Med.*) suggests this salt as a coloring substance, less poisonous than arsenite of copper, and more beautiful than oxide of chrome, or green ultramarine.

It is prepared by dissolving sulphate of copper and borax in the relation of their equivalents, (16 to 24,) and mixing the solutions, collecting the pale green precipitate, washing it with very cold water, drying, and subsequently heating in a crucible to a dull red heat. All the water is thus driven off, and its shade becomes deeper or lighter green, according to the continuance of the heat.

Spirit of Mustard, (Alcool Sinapique.)—M. Martin Barbet, of Bordeaux, makes this preparation by macerating during two hours 250 grammes of black mustard flour in 500 grammes of cold water; then adds 120 grammes of alcohol, 86 per cent., and distills to obtain 120 grammes of liquid. Thus made, spirit of mustard is much cheaper than that obtained by the solution of the oil in alcohol, and equally active.—*Journ. de Chim. Méd.*

Alteration Produced on Linen by Syrups.—According to M. P. Doré, syrups in general, and especially simple syrup, deposited on linen and exposed in a place where the temperature is moderate, becomes dry, and deprives the linen of its flexibility and tenacity to a degree that will cause it to tear under a feeble effort. On examination of the rent, the linen appears as though it had been touched with a corrosive liquid, like diluted SO_3 . In this case the flexibility and tenacity of the filaments disappear, and their nature altered as when linen is frozen in water.—*Journ. de Chim. Méd.*, Mai, 1863.

On the Ethereal Juices of Poisonous Plants, and on the Ap-

proximate Testing of Alkaloids in their Extracts. By M. Le page, of Gisors.—Professor Bouchardat proposed, more than a dozen years ago, the employment of sulphuric ether for the preservation of the juices of active plants with all their properties. This method, which does not appear to have received much attention, doubtless because it has not been sufficiently tried, is, nevertheless, *excellent*, as I have found on many occasions.

In proof of this, I have prepared the extract of Belladonna from the juice of this plant obtained in the month of June, 1852, and preserved to this time, by means of ether, that is *more than ten years*. The juice, after being heated in a water bath to deprive it of ether, offers the characteristic odor of the fresh juice of belladonna. A litre (2½ pints) yielded 22 grammes of extract, possessing exactly the chemical, physical, and physiological properties of extract prepared with the juice of the same plant recently obtained.

These juices when long kept deposit a large part of their earthy salts, which is unimportant. The author thinks them preparations of sufficient importance to deserve the attention of the revisors of the French Codex, both for separate use and for the preparation of extracts.

The author suggests the following method of testing chemically and quickly the value of an extract containing an alkaloid. Take one gramme (15½ grs.) of the extract, dissolve it in double its weight of distilled water, put the solution in a test-tube and add from 25 to 30 centigrammes (4 to 5 grs.) of bicarbonate of potassa pulverized. When all sign of effervescence has ceased, 5 or 6 times its volume of pure ether is thrown on the mixture, closely stopped, and shaken quickly for two or three minutes—several times. After subsidence, the ether is decanted into a capsule and allowed to evaporate. The amber colored residue is dissolved in six or eight grammes of water, acidulated with one or two drops of muriatic acid. This solution is nearly colorless, and should be precipitated decidedly by iodohydrargyrate of potassium, and yield a flocculent precipitate with a solution of tannin, if the extract is of the full strength.

By comparing the volume of these precipitates, with those of

an extract known to be of standard strength, a fair judgment can be obtained.—*Journ. de Pharm.*, Mai, 1863. [The result would be more exact if the method of Prof. Mayer (see page 20 of this volume) were followed.—ED. AM. J. PH.]

On the chemical composition of Rosa Gallica. By M. Filhol.—The author published last year a work relative to the coloring matter of flowers, in which the occurrence of quercitrin was noted. In again examining the flowers of the red rose, he has ascertained that their astringent property ought to be attributed in great degree to the quercitrin, and that but traces of true tannin can be found. When the petals, coarsely powdered, are exhausted with ether, a yellow tincture is obtained, the flowers retaining their beautiful red color. The ethereal tincture by evaporation yields a soft greenish yellow extract. Boiling water dissolves a part of this, forming a yellow solution, whilst a greenish fatty matter is left. This solution gives a deep bottle green precipitate, with persalts of iron. It is colored bright yellow by alkalies, and gives, with lead salts, lakes of an intense yellow color; and lastly, when evaporated to dryness, it leaves a dry residue, which assumes a lively yellow tint when moistened with strong hydrochloric acid. Quercitrin may be isolated from the lead precipitate.

Rose leaves contain also a large portion of uncrystallizable sugar (20 per cent.), some cyanin, and gallic acid.—*Reprt. de Pharmacie*, Mai, 1863.

Preparation of Crystallized Sulphate of Atropia. By M. J. Laneau.—Heretofore, commercial Sulphate of Atropia has been almost wholly in powder,—a circumstance not favorable to its commercial purity; and M. Laneau, deeming that an agent so important in ophthalmic surgery should be of unquestioned purity, offers the following formula for its production in crystals:

Take of Crystallized Atropia	289 grains,
Absolute Alcohol	800 "

The solution is effected by agitation in a glass capsule, aided by a very gentle heat. Then weigh in a small phial.

Sulphuric acid (sp. gr. 1.85)	40 grains.
Dilute this acid with 300 grains of anhydrous alcohol, and add it little by little to the solution of Atropia. To complete	

the saturation the solution is stirred with a glass rod moistened slightly with concentrated alcohol, until test paper shows neutrality. The solution is then suffered to evaporate spontaneously. The crystallization is effected in three or four days in the summer, or five or six days in winter. The thinner the stratum of liquid, the more quickly is the process effected. The crystals, which may be dried without destroying their form, are in colorless needles more or less interlaced. When chloroform is used instead of alcohol, the salt is obtained in a gum-like mass. Crystallized Sulphate of Atropia is soluble in water, weak alcohol and absolute alcohol, but is insoluble in chloroform and ether.—*Repert. de Pharm.*, Mai, 1863.

NOTE ON THE ORDEAL BEAN OF CALABAR.

(*PHYSOSTIGMA VENENOSUM*, Balf.)

By DANIEL HANBURY, F. L. S.

The recent experiments of Drs. Argyll Robertson, Fraser, Stewart, Messrs. Bowman, Wells, and others on the Ordeal Bean of Calabar* and the fact elicited by these experiments that it possesses the peculiar power of causing the sphincter pupillæ and ciliary muscle to contract, render it probable that this remarkable seed will find a useful application in ophthalmic medicine; and the present moment is therefore appropriate for reviewing some of the facts hitherto ascertained respecting it.

The first important notice on the subject is contained in a most interesting and valuable paper by Dr. Christison read before the Royal Society of Edinburgh, February 5, 1855. In this paper the author, after alluding to various vegetable substances used by the natives of tropical Western Africa in ordeal by poison, describes as one of pre-eminent virulence, a large leguminous seed called *Eséré* used by the negroes of Old Calabar, in the Gulf of Guinea. This seed which Dr. Christison called the *Ordeal Bean of Old Calabar*, and the botanical origin of which was at that time unknown, was the subject of some remarkable toxicological experiments which amply proved

* *Edinburgh Medical Journ.* March, 1863; *Medical Times and Gazette*, May 16th, 1863.

it to possess powers of no ordinary character. Dr. Christison also made some experiments on the seed with the view of isolating its active proximate principle, but was unsuccessful, partly owing, it is probable, to the limited amount of material at his disposal. "All I can say," he observes, "is that the seed like others of its natural order contains much inert starch and legumin, and 1.8 per cent. of fixed oil, also probably inert; that its active properties may be concentrated in an alcoholie extract, which constitutes 2.7 per cent. of the seed; and that this extract does not yield a vegetable alkaloid by the more simple of the ordinary methods of analysis."^{*}

Some of the Ordeal Beans in Dr. Christison's possession having been placed in earth, germinated in the Botanic Garden of Edinburgh, and in the garden of Professor Syme, producing vigorous plants; but as these did not flower, no determination of the genus to which the plant belonged could be made. At length about the year 1859, the Rev. W. C. Thomson of Old Calabar, a good botanical observer, was so fortunate as to obtain, after many trials, complete and excellent specimens of the plant, some of which, preserved in fluid, were communicated to Mr. Andrew Murray and Professor Balfour. Their examination devolved chiefly on the latter gentleman, who on January 16, 1860, read before the Royal Society of Edinburgh a *Description of the Plant which produces the Ordeal Bean of Calabar*, which, illustrated by two plates, was subsequently published in the Society's *Transactions*.[†]

The Ordeal Bean belongs to the natural order *Leguminosæ*, the sub-order *Papilionaceæ* and tribe *Phaseoleæ*; but subordinate to this, its characters have been considered sufficiently peculiar to warrant the formation of a special genus for its reception. This has accordingly been done, the new genus receiving from Dr. Balfour the name of *Phyeostigma*,[‡] and the one species which it contains, that of *venenosum*.

* Pharm. Journ. vol. xiv. (1855), p. 472.

† Vol. xxii. p. 305.

‡ From *φεύγω* to *inflate*, and *στόμα*. The genus is thus defined.—*Calyx campanulatus, apice quadrifidus, laciniis brevibus, lacinia suprema bifida. Corolla crescentiformis, papilionacea; vexillum recurvum, apice bilobatum, basi angustatum, margine utroque auriculatum, membranæ*

The most remarkable character of the genus *Physostigma* is that derived from the stigma, which possesses a singular, crescent-shaped, hooded appendage. By this character and the long grooved hilum of the seed, it is separated from the nearly allied genus *Phaseolus*; and from *Mucura*, to which its seed bears considerable resemblance, by the characters of its flowers and pod; from *Canavalia* by its diadelphous stamens and other characters; and from *Lablab*, by its phaseoloid carina and pistil.

Physostigma venenosum, the Ordeal Bean, is a large climbing perennial with a woody stem of two inches diameter and sometimes fifty feet in length. Its large leaves are pinnately trifoliate, with ovate acuminate leaflets. Its papilionaceous flowers are in pendulous racemes, the stalk or rachis of which is covered with tuber-like knots; each flower is about an inch in length, and of a pale-pink or purplish color, beautifully veined. The legume when full-grown is about seven inches in length, elliptico-oblong with a short curved point stipitate, dehiscent and containing two or three seeds. The seeds which are oblong or somewhat reniform, are from 1 to $1\frac{1}{2}$ inches in length by about $\frac{3}{4}$ of an inch in breadth; their convex edge marked by a long sulcate hilum, extending as a deep furrow from one extremity of the seed to beyond the other. The exterior of the seed is somewhat rough with a dull polish; its color is a deep chocolate-brown, somewhat lighter on the raised edges of the furrow. The seeds weigh, on an average of twenty, 67 grains.

The Ordeal Bean is difficult to obtain even near the localities where it is produced. Dr. Christison states upon the authority of the Rev. H. M. Waddell of Old Calabar, that "the plant is inflexa auctum, media longitudinaliter bicallosum; alae obovato-oblongae, libere, supra carinam conniventes, versus basin appendiculatae. Discus vaginifer. Ovarium stipitatum, 2-3-ovulatum. Stylus cum carina tortus, infra stigma subtus barbatus; stigma obtusum cucullo cavo oblique tectum. Legumen dehiscens, oligospermum, elliptico-oblongum, subcompressum, extus rugosum, endocarpium intus telâ laxâ cellulari tectum, isthmis cellulosis inter semina. Semina strophiolata, hemisphaerico-oblonga, hilo latesulcato semicincta.

Herbæ suffruticosæ volubiles in Africa occidentali tropica crescentes: foliis pinnatim-trifoliolatis, stipellatis, floribus nodoso-racemosis, pureis.

everywhere destroyed by order of the king, except when it is preserved for supplying the wants of justice,—and that the only store of seeds is in the king's custody." Whether this remains to be the fact, I know not; but Mr. Gustav Mann, Collector to the Royal Gardens, Kew, to whom I wrote some time ago requesting a supply of the beans, remarked in a letter under date Nov. 24, 1861, that he had been able to procure but few, "as the people do not like to give them to Europeans." There is no reason, however, to suppose that this reluctance will continue if a good money-value become attached to them.

The best form in which to employ the Ordeal Bean as a medicine is a point of importance to the pharmacist, but one upon which further experience is required. Dr. Christison found that the active matter of the bean could be separated by alcohol, and he obtained (as already stated) 2.7 per cent. of extract by this menstruum. I found that upon reducing the bean to coarse powder and exhausting it with cold alcohol (sp. gr. .838), 2.3 per cent. of dry extract was obtained; and upon further exhausting the residue with similar alcohol at a boiling temperature, a further product of extract amounting to 2.2 per cent. Whether these extracts are alike in power is at present hardly proved, but the result of a single experiment appears to show that the second is as powerful as the first. The alcoholic extract rubbed down with water, forms a turbid liquid, which however efficient, is certainly not an elegant preparation, and it has been said rapidly to spoil. It has been prepared of several strengths, so that one minim may represent $\frac{1}{2}$, 1, 2, or 4 grains of the bean. In glycerine, the alcoholic extract dissolves freely, yielding a tolerably clear solution; and if this menstruum be unobjectionable as an application to the eye, it will certainly prove convenient pharmaceutically, as it affords a solution not liable to change by keeping.

The residue of the bean, after the extract had been obtained as above described, was dried; and with the view of ascertaining whether it still contained a poisonous principle, some of it, mixed with bread and lard, was administered to a mouse and rat. Neither animal would eat the mixture very readily; the mouse after some hours ate a pellet containing five grains of the residue, and died in the course of the next day. To the rat, which at intervals ate a much larger quantity, the residue also proved

fatal in about forty hours. These experiments show that the bean had not been entirely deprived of its active properties.—*London Pharm. Journ.*, June, 1863.

RENDERING CERTAIN SUBSTANCES LESS PERVERSIVE TO
THE AIR AND LIQUIDS,—PROTECTION OF METALLIC
SURFACES, &c.

By J. STENHOUSE, Barnsbury Road, London. Dated Jan. 21st, 1862.

For the applications severally described in the headings, Dr. Stenhouse employs a paraffin, either in a melted state alone, or dissolved in a suitable solvent, which may be one of the following:—coal tar, naphtha, petroleum, or bisulphide of carbon. The mode of using this substance varies with the object in view. When applied to cloth or other textile fabrics, for the purpose of rendering them waterproof, these materials are stretched upon a frame, and laid face downwards upon a clean, flat, metallic surface, an iron plate for instance, which is heated by steam or direct fire to a temperature between 130 and 250 degrees Fahrenheit. As soon as the cloth has become sufficiently warmed through, a large block of solid paraffin is rubbed over the wrong side of the cloth, and this surface coated as evenly as possible. In order then to distribute the paraffin among the fibres, or force it into the substance of the cloth, a hot flat-iron is passed over it, or lengths of the material pressed between hot rollers, and when the impregnation is completely effected the cloth is removed and allowed to cool.

A similar mode of proceeding may be carried out in the treatment of leather, fur, felt, silk, calico; and trifling modifications in the mechanical arrangements will permit of its adaptation to rope and hempen goods, thread, and artificial flowers.

In protecting metallic surfaces, the patentee employs paraffin, melted or dissolved as before, for coating all kinds of gilded or tinselled articles, especially those covered with dutch gold, silver leaf, bronze powders, and tin or copper foil.

By the process of Dr. Stenhouse it is easy to confer upon cloth any acquired degree or character of water-proofing; the use of a small proportion of paraffin appears to have great power in enabling the fabric to repel moisture, whilst a more thorough treatment effectually closes the interstices of the cloth against rain or water.—*Chem. News, Lond.*, May, 16th 1863.

NEW ISINGLASS ADHESIVE PLASTER.

BY E. ANDREWS, M. D.

Professor of Surgery in the Chicago Medical College.

The adhesive plasters in use, consist, almost exclusively, of two kinds: the emplastrum adhaesivum of the Pharmacopœia and the isinglass plaster. The advantages and disadvantages of these articles are the following:—

1st. The emplastrum adhaesivum of the Pharmacopœia:—This long used plaster has the merit of being strong and cheap. Its disadvantages are, that the turpentine in its composition is apt to irritate and even blister delicate integuments. If it is kept on hand too long, it becomes dry and will not adhere; and in military practice, if the weather is cold, the impossibility of warming the strips on the field, renders the article worthless. The common idea, that it resists moisture, on account of its resinous composition, is erroneous, as it loosens from the skin with the steady application of water, as entirely as any isinglass.

As an improvement on this old standard article, we have several varieties of isinglass plaster from different manufacturers. These differ somewhat among themselves, but are all essentially alike in appearance and use. They, apparently, consist of some form of gelatin applied to a thin, delicate slip. The plasters thus made, are thin, transparent, and adhere well. Their advantages are, that they are extremely elegant, on account of their delicate transparency, that they do not change by keeping, that they adhere readily and quickly by simply moistening the surface without requiring heat, and can be as readily removed by application of water again. Moreover, they do not irritate the most delicate skin. These qualities fit them admirably for all the lighter operations of surgery; but for the heavier work, such as extension and counter-extension in fractures of the femur, and strapping in fractures of the clavicle, they are entirely worthless, for the following reasons:—

1st. The material on which the glue is laid is too fragile, and has not strength enough to sustain the tension required.

2d. The articles, as now sold, are in too small pieces. The rolls are about nine inches wide, and purport to be a yard long,

but are, generally, by the villany of somebody, found to be short of even that small measure. For adhesive-strap dressing of the clavicle, two strips are required; each two and a half inches wide and one and a half yards in length; and for adhesive-strap counter-extension, according to my method, in fractures of the femur, two strips are required, each two yards in length and three inches in width, besides the extension-straps and the belt-strap. No such strips can be cut from the articles now sold, except by piecing them together.

3d. The expense of the article is very heavy. These little miserable patches of plaster, each one less than a quarter of a square yard in area, are retailed to physicians at the extortionate price of a dollar each. Now, even if it were possible to use them in heavy surgery, the cost would be a serious objection. A quantity sufficient to make a solid adhesive-strap extension and counter-extension on an adult fractured femur, would come to, at least, three dollars.

For these reasons, I have requested several apothecaries to produce a new article, which should have the strength and cheapness of the old plaster, with the advantage of the gelatin surface.

Mr. Dillingham, of State street, has been kind enough to carry his experiments to a successful issue. He has produced an article of gelatin plaster laid on linen, which is in large rolls of about the same width as the old emplastrum adhæsivum, and which he sells at the extremely low rate of twenty-five cents a yard, being by far the cheapest and best article in the market for heavy surgical work. This plaster has strength enough for any purpose required, and adheres to the surface with unequalled tenacity. It is also perfectly adapted to the closure of ordinary incised wounds, and to every other purpose that any plaster serves. It combines the following advantages, viz., cheapness, strength, adhesiveness, and freedom from irritation.

As it is not a patent article, and there is no secret about its composition, I trust that our large manufacturers will, by and by, come down from their high stilts, and consent to produce for the profession some similar preparation, capable of being used for the work we have to do, and at a price which is less preposterous than what we have heretofore paid.—*Chicago Med. Examiner*, Feb., 1863.

BLACK MUSTARD SEED.

Will & Koerner (*Annalen der Chemie u. Pharm.*, Bd. 125, Marz, 1863,) have published a paper on the mode of formation of the volatile oil from black mustard seed. The body, by the decomposition of which the essential oil is formed, was found by Bussy to be the potassa salt of myronic acid, which with myrosin, the peculiar ferment of the seeds, and water, or by the action of acids, yields the oil and a few other products. Among the latter are sulphur, sulphuric acid, sugar, cyanide of allyl. The last named substance by the action of potassa is converted into ammonia, a volatile fatty acid, of the same composition and probably identical with the crotonic acid obtained from croton oil. The cyanide of allyl also forms from the essential oil of mustard (sulphocyanide of allyl) when in contact with the water, sulphur being disengaged, and it is a constant constituent of the commercial oil; it is much lighter than water, and boils at 245 degrees Fahr., while the true oil of mustard boils at 290 degrees, and sinks in water.—*Druggists' Circular, May, 1863.*

CORTEX MUSENÆ.

This bark was formerly known in commerce as *Cortex Brayeræ anthelminticeæ*, under the belief that it was that of the tree, the flowers of which are known as Koosso. The source of this bark has long remained in doubt, and the plant from which it is obtained, a tree, was placed in the order of leguminosæ, until Buckner, Hochstetter, and Stendel proved it to be the *Rottlera Schimperi* (Nat. Ord. *Euphorbiaceæ*, Sect., *Crotoneæ*), a large tree of Abyssinia. The bark of this tree mixed with koosso, is employed in that country for the treatment of tape-worm. Musea bark, as it occurs in commerce, is in quills of several inches in length, from one to two inches in width, the outer surface very uneven, rough, and fissured, the epidermis of a brown color, underneath which there is a very thin greenish cellular coat overlying a comparatively thick periderm of a pale yellow color and hard granular structure, and beneath this the liber of a very tough and long fibrated tissue. It possesses no odor; the periderm has little taste, while the liber possesses a peculiar sweetish nauseating one, and causes an acrid, long continuing

sensation in the fauces. C. Thiel, who has lately examined this drug, found as the active ingredient, a non-crystallisable substance of a very acrid taste, having many properties in common with saponin, but distinguished from it by a greater solubility in alcohol. Besides this, the musena bark contains a fatty wax-like substance, a yellowing coloring matter, extractive, and a bitter principle. It yields $5\frac{1}{2}$ p. c. of ashes, consisting of potassa, soda, lime, magnesia, sesquioxyd of iron, hydrochloric, sulphuric, phosphoric, carbonic, and a large quantity of silicic acid. Very little is known as to the therapeutical action of the drug. Girtler, of Vienna, has prepared an alcoholic extract, which is now being tried by the profession.—*Neues Jahrb. f. Pharm.* Bd. xviii., January, 1863, p. 374, from *Druggists' Circular*.

WINES ON THE RHINE.

From Bonn to Coblenz, and from this city to Mayence, the country is covered with vineyards, although to the north of this the vines are of little comparative note. The latitude of this city is nearly 51° corresponding with the northern shores of Newfoundland, or the southern borders of the Hudson's Bay: and yet the finest and most aromatic wines of the world are the product of this favored region. Nowhere, indeed, is the fondness for vine cultivation more evident in every grade and class of farmers than in the vine districts bordering on this river and its tributaries. The humblest peasant has his little vineyard. Every accessible spot on the declivities and among the rocks and precipices with an auspicious aspect, is decorated with the favorite plant. Owing to the sloping banks, from Mayence to Bonn, the vineyards on either side of the Rhine are in full view, and in no other country on the globe are they seen to such advantage. Here is Erbach enthroned among vines; here the Rheingau, with its famed Johannisberg seated on a crescent hill of red soil, with every cranny cultivated that admits of vegetation; here are Mittleheim, Geisenheim, and Dudenheim, the last with its strong fine-bodied wine, the grapes basking on their promontory of rock in the warm summer sun, imbibing its generous heat from dawn to setting; and then again on the other

side is old Bingen, celebrated in song, delightful, sober, majestic, adorned on every side by its terraces of vines; the summits of the lofty hills and crags everywhere crowned with feudal relics or monastic remains. At Coblenz the soil becomes particularly well adapted for the cultivation of the grape, though the right bank of the river is most noted for its wines. The *Rheingau*, the most celebrated of all the wine growing districts, consists of an area of ten miles in length by four in breadth, which has been known for many centuries for the excellent quality of its produce. The valley of the Rhine, taking from Mayence a western and north-western course, exposes it to the warm south-west winds, which have a very salutary effect on the maturity of the grape. The Riessling, a small white grape, is the one chiefly cultivated here; and although not well adapted for the table, has a finer and more aromatic *bouquet*, it is said, than any other grape known. It is in the centre of this district, on a gentle eminence on the right bank of the Rhine, and in plain view from the river, that the celebrated Johannisberg vineyard is situated. This small domain of only forty acres in extent, yields on an average about 9600 gallons of white wine annually, selling in 1859, at public sale, for 60,000 dollars. I am told that four qualities of wine are produced from this vineyard, the best selling for over seven dollars per bottle, or twelve thousand florins (\$6000) per ton. The price of the different qualities varies from \$1.50 to \$7 per bottle. It is sometimes sold, however, by the cask, especially in bad years. The cellars or vaults are very extensive, but it is difficult to gain admittance to them. There are no gardens attached to the Chateau, as the ground is too valuable, nor are there any trees, except on the north side of the house, where is a sort of wilderness of limited extent. The best wine, I am informed, is the product of vines growing close under the Chateau, and, indeed, partly over the cellars. The rare excellence of the wines of this district is generally accounted for from advantageous exposure to the direct rays of the sun, and the peculiar qualities of the slaty soil, which retains the heat of the sun's rays, so necessary for bringing the grape to maturity. This is proved by the fact already stated, that the best wines are confined to the north bank of the river, the valley being completely sheltered from north and east winds by the interve

ning barrier of mountains. A good deal, however, is evidently owing to the careful management of the vines, and the great care bestowed on the vintage. The grapes, for instance, are allowed to remain on the vines as long as they can hold together, and the vintage never takes place till the grapes are more than perfectly mature. The vineyard is divided into small compartments, the produce of each of which is put into separate casks, and even in the best years there is a difference in the value of different casks. In bad years the wine never goes into the cellars, but sells at once for what it will fetch. The best of the Rhine wines, after being fermented in casks, are repeatedly racked, and then suffered to remain for years in large reservoirs to acquire perfection by time. These huge casks contain 350 tuns. The Germans have always held that wines mellow best in large vessels, hence the celebrated Heidelberg tun, 31 feet long by 21 high and holding 600 hogsheads. Hence, also, the enormous tuns of Tübingen, Gruningen, and Konigstein, the last of which contains 3709 hogsheads. All these tuns were formerly kept carefully filled. Some of these I have examined, but could not ascertain that they had been filled for many years past. I have mentioned the Riessling grape, but there are also the Klimberger, the Traminer, and the Orleans variety, all of which are cultivated in the Rheingau and produce excellent wines.—*Correspondence of Prof. Charles A. Lee, in the Am. Med. Times.*

TEST FOR CHOLESTERIN.

Hugo Schift describes the following reaction of cholesterin (*Annalen d. Chem. und Pharm.* Bd. cxv. s. 313). If cholesterin be moistened with hydrochloric or sulphuric acid containing perchloride of iron, it becomes of a magnificent violet color. A mixture of two or three volumes of concentrated hydrochloric or sulphuric acid and one of a dilute solution of the perchloride will answer for the experiment, or even the ordinary commercial hydrochloric acid. A small piece of cholesterin should be rubbed by means of a glass rod with a drop of the reagent, and the mixture then gently warmed. It first becomes of a reddish, which as the temperature rises changes to a blue violet, color. When sulphuric acid is used the mixture must be warmed more

cautiously. It first becomes carmine red, then violet, and at a high temperature is carbonized. Nitric and phosphoric acid with the perchloride of iron will not give the reaction.—*Druggists' Circular.*

ON THE MANUFACTURE OF NICKEL.

BY LEWIS THOMPSON, M. R. C. S. &c.

Commercial nickel is a very impure article, and bears no more relation to pure nickel than brass or bell-metal does to copper. The following table will show its average composition, as it is found in the market:—

	English.	English.	German.	German.	French.
Nickel.....	86.0	84.5	75.7	80.9	77.5
Cobalt.....	6.5	8.2	2.2	5.2	3.7
Copper.....	—	0.6	12.5	7.7	10.2
Iron.....	1.4	1.1	0.4	1.2	1.1
Arsenic.....	1.3	0.4	2.6	3.8	2.8
Zinc.....	2.0	0.7	4.1	0.5	1.4
Manganese.....	0.2	0.8	—	—	0.6
Sulphur.....	1.7	2.2	2.3	0.2	1.1
Carbon.....	0.5	0.9	0.2	0.1	0.7
Silica and Alumina.....	0.4	0.6	—	0.4	0.9

From what I have before said, there is every reason to suppose that our accounts of metallic nickel relate to an alloy of that metal with cobalt, in greater or smaller proportion; that, in fact, absolutely pure nickel has not hitherto been obtained. Pure nickel is, however, much more easily made than pure cobalt, for its affinity for oxygen is much less. Taking advantage of this fact, I made up a quantity of pure oxide of nickel into a paste by means of a little water, and forced this paste through a perforated earthenware plate, so as to form it into a granulated mass; when this mass had been thoroughly dried, I introduced it into a porcelain tube, and after heating it red hot, I passed a current of pure hydrogen gas over it, and continued this until it had become cold. The gray metallic sponge thus produced was fused with a little borax in a crucible, lined with pure alumina, and yielded a beautiful white silvery looking button of the weight of 620 grains; its specific gravity was 8.575, and it was almost as soft as copper. Its malleability

seemed very great indeed, for a piece of it was rolled out nearly to the thinness of tin foil ; it showed, however, a disposition to tarnish after a few days' exposure to the air, and become then of a pale yellow color—a kind of green-sickness tinge. Its magnetic properties were less decided than those of either cobalt or iron ; and judging by the globular form and other evidences of perfect fusion in the button, I believe that the nickel is much more fusible than the two metals just mentioned. When portions of it were melted with copper and zinc, in the quantities usually adopted to form albata, it produced a compound vastly superior in appearance to any of the miserable make-shifts that now disgrace our markets. Indeed, I am quite convinced that it would well repay any respectable person to commence the manufacture of pure nickel ; and it would not surprise me, if a compound of aluminium and nickel could be formed, which, for beauty of appearance, might equal silver, and surpass it in durability and freedom from sulphurous deterioration.

Whilst alluding to the advantages of an improvement in the manufacture of nickel, it may not be amiss for me to notice two points of some importance in the way of improvement. At present the extraction of nickel from the ore is made to depend very much upon the affinity of arsenic for that metal, so as to form with it an arseniuret of easy fusibility and sufficient specific gravity to separate freely from the melted slag or gangue ; and for this purpose large quantities of arsenic are employed by the workmen, not only to the detriment of their own health, but also to the injury of their neighbors. This pernicious practice is quite unnecessary, as I have myself proved by experiments upon a large scale ; for example, after carefully roasting six hundred weight of common ore of nickel, which is an arsenio-sulphuret, I mixed it with half its weight of chalk, and threw the mixture into a cupilo furnace in full blast ; the result was, that the lime of the chalk formed, with the quartz and oxide of iron in the ore, a perfect flux, whilst the oxide of nickel, being easily reduced to the metallic state, fell, in that condition, into the well of the cupilo, from whence it was run out in a melted form, and readily separated from the slag. There was no appreciable loss of nickel in this operation, and the rough metal was found to contain 88 per cent. of pure

nickel, the rest being cobalt and iron, with a little sulphur, but no arsenic could be detected in it; moreover, this rough metal might, from the cheapness of the process, have been profitably sold at 3s. per lb., and was decidedly more pure than the ordinary commercial nickel.

The other point to which I have alluded is applicable to the wet mode of separating nickel, and depends upon a fact hitherto, I believe, unnoticed by chemists. If we have in solution a mixture of the sulphates of nickel, cobalt, zinc, manganese, iron, and copper, we have only to add to this solution in a warm state, as much sulphate of ammonia as it will dissolve, and then set it aside to cool. Almost every particle of the nickel and cobalt will separate as a green crystallized powder, and leave the other metals in solution. The explanation is very simple. The sulphates of nickel and cobalt form triple salts or alums with the sulphate of ammonia, and these salts are absolutely insoluble in a cold saturated solution of sulphate of ammonia, particularly when this solution is slightly acidulous. I shall conclude these remarks upon nickel by stating that this metal appears to possess the property of "welding" like iron. At my request, a workman heated two small bars of nickel, which had been previously powdered over with borax, the bars were heated in a forge, and the two hot ends "jumped" together, that is to say, the white hot ends were forcibly driven one against the other by gentle blows with a hammer, applied to the other ends, the symmetry of the bar being preserved by blows applied laterally. Although the point of junction was afterwards subjected to much twisting, straining, and so forth, with a view to test its cohesive power, yet it showed no signs of weakness, even after much cold hammering.—*Journ. Frank. Institute, May, 1863, from Newton's London Journal, February, 1863.*

PROHIBITION OF CALOMEL AND TARTAR EMETIC IN THE ARMY.

Surgeon-General's Office,
Washington City, D. C., May 4, 1863.

I. From the reports of Medical Inspectors and the Sanitary reports to this office, it appears that the administration of calomel has so frequently been pushed to excess by military sur-

geons as to call for prompt steps by this office to correct this abuse; an abuse, the melancholy effects of which, as officially reported, have exhibited themselves not only in innumerable cases of profuse salivation, but in the not infrequent occurrence of mercurial gangrene.

It seeming impossible in any other manner to properly restrict the use of this powerful agent, it is directed that it be struck from the supply table, and that no further requisitions for this medicine be approved by Medical Directors. This is done with the more confidence, as modern pathology has proved the impropriety of the use of mercury in very many of those diseases in which it was formerly unfailingly administered.

II. The records of this office having conclusively proved that diseases prevalent in the army may be treated as efficiently without tartar emetic as therewith, and the fact of its remaining upon the supply table being a tacit invitation to its use, tartar emetic is also struck from the supply table of the army.

No doubt can exist that more harm has resulted from the misuse of both these agents, in the treatment of disease, than benefit from their proper administration.

W. A. HAMMOND, Surg. Gen.
Amer. Drug. Cir., June, 1863.

THE BITTER PRINCIPLE OF GENTIAN.

Chemists have long failed to discover or isolate the body to which gentian owes its purely bitter taste, though there has been eliminated an acid principle, gentianic acid. Ludwig and Kromayer have at last obtained it from an alcoholic extract of the fresh root of gentian (*lutea*), the watery solution of which transferred its bitterness to animal charcoal by two successive treatments. The charcoal was extracted with alcohol, the tincture evaporated, the residue freed from precipitable matter by means of oxide of lead, and after removal of the latter by sulphuretted hydrogen, evaporated to the consistence of a syrup; the latter precipitated the principle by agitation with ether. This *gentiopicrin* is crystallizable, is readily soluble in water and alcohol but not in ether, neutral, and not precipitated either by tannin or subacetate of lead. It is a glucoside, for contact

with mineral acids, as well as oxalic and acetic acids, splits it into fermentable sugar and a brownish, yellow, amorphous body, *gentiogenin*. The formula $C_{40}H_{50}O_{24}$ for gentiopicrin requires

Carbon,	51.948 p. c.
Hydrogen,	6.494
Oxygen,	41.558.

—*Amer. Drug. Cir. from Sitzungsber. Wien. Akademie, Bd. xlv., Januar. 1862, in Chem. Centralblatt, 1863.*

ARTIFICIAL INDIA-RUBBER.

In the chemical department of the Sheffield Literary and Philosophical Society were shown specimens of a new and valuable invention, patented by Mr. A. Parkes, of Birmingham, and called after him "Parkesine." It is a compound of oil, chloride of sulphur, and collodion, and may be used as India-rubber and gutta-percha. In its plastic state it is easily pressed into molds, and when set becomes hard and durable. It may be produced of any color, and also made to imitate ivory. If this latter substance can be successfully imitated, Mr. Parkes will have accomplished what many men have long tried to do, and on which some have in vain sacrificed fortune and health. The inventor only shows the articles as the work of an amateur, and to give some idea of the capabilities of the material, which he says can be produced in quantities at 1s. per lb. Allied to this is another substitute for India-rubber, "Campticon," an invention of Mr. Frederick Walton. This remarkable substance is formed by the oxidization of linseed oil. Plates of glass are dipped into linseed oil, and allowed to dry. The plates are again dipped and dried, until a sufficient film has accumulated, and then it is removed. In describing his invention, Mr. Walton says: "I soon found that by crushing the solid oxidized oil obtained in sheets, as described in my patent, and working it thoroughly in hot mixing rolls, I produced a substance which required only the cohesive nature which exists so strongly in India-rubber. The addition of a small proportion of shellac soon gave that which was wanting; and I found in my power a

material singularly like caoutchouc when worked into dough, and which could be rolled on to fabrics in the same manner, and with the same facility. Pigments could easily be added to give color, and the addition of the resins gave other or rather varied proportions of adhesion, useful in affording the means of uniting fabrics as by rubber. Fibre, whether flock or cork, mixed in and rolled into sheets, gave me samples of kamptulicon and other floor-cloths." Not only has this singular product been thus assimilated to rubber for uses on fabrics, or combined with fibre for floor-cloths, but, still more strange, it is capable of being worked with pigment, and vulcanized exactly as India-rubber has been described to be, and forms a hard compound like vulcanite and ebonite, excepting that the sulphur is not necessary. It will readily be seen how valuable a substance is here represented; for while it possesses in so great a degree all the qualities of India-rubber, it may be produced at a much less cost. The specimens which Mr. Walton has sent for exhibition show the material in its different stages of manufacture, from the films that are removed from the glass to the masses ready for manufacture into any of the articles above enumerated.—*Sheffield Indep.*

" [Some three or four years ago, Dr. R. F. H. Havemann, of New-Brunswick, N. J., secured patents in this country and in Europe for an imitation of ivory, produced by the action of chlorine on India-rubber or allied gums. By his process solid lumps of India-rubber or gutta-percha are dissolved in one of the well-known solvents used for the purpose; and this solution is brought into contact with chlorine by passing streams of gaseous chlorine into the same. When the combination of the gum with the chlorine is perfected, the solvent is removed by evaporation at a low temperature. After removing the liquid by filtering or evaporation, the composition of gum and chlorine is well washed with alcohol and then pressed and dried, when it forms a white, hard mass, similar to ivory in appearance and elasticity. We have seen billiard balls made of it, but we think they lacked the weight necessary to render them equal to ivory; for many purposes, however, it is an excellent substitute for ivory.—*Amer. Drug. Cir. from Sci. Amer.*

ON CINCHONIA AS A SUBSTITUTE FOR QUINIA.

In the 'Pharmaceutical Journal' for February last, I observe an interesting paper by Mr. Joseph Ince, recommending the salts of cinchonine in lieu of those of quinine; now so far as my experience extends with reference to the employment of cinchonine in the treatment of febrile and other miasmatic diseases of Western Africa, it has proved a decided failure, owing to the headache which has uniformly attended its administration. When I was in medical charge of the troops in Sierra Leone, a large quantity of cinchonine was furnished to the hospital with the view of testing its remedial properties, and also of ascertaining whether it would not answer as an economical substitute for quinine. It was therefore given to both European and negro patients who were suffering under the milder forms of remittent and intermittent fevers and free from any local congestions, in the ordinary doses in which the sulphate of quinine was used. The results of the trial were, however, of such an unsatisfactory character, from the pain and cerebral congestion induced, that the medicine had to be discontinued. It was subsequently combined with calomel and morphia, but without any sensible diminution of the cerebral disturbance. When conjoined with the latter, delirium sometimes set in, which was only relieved by the application of blisters to the neck. With these drawbacks, therefore, cinchonine can never be resorted to as an efficient substitute for quinine in the treatment of tropical diseases.—*Extract from a letter to Professor Bentley, from Dr. W. F. Daniell, Kingston, Jamaica, March 24th, 1863, in London Pharm. Journ.*

ENGLISH INK-GALLS.

At a meeting of the Exeter Naturalists' Club, held in Exmouth, Dr. D'Urban read a paper on the "English Ink-Galls." Most persons, he said, must have noticed the hard brown galls, about the size of musket balls, so conspicuous in winter on the Oaks about Exeter. They are supposed to have made their first appearance in Devonshire about the year 1847. They were

first noticed by Mr. Parfitt, who sent specimens of the insect causing them to Mr. Westwood, in 1848 or 1849. It has only lately, however, been determined to be *Cynips Kollaris* of Hartig, a species well known in Germany. About three years ago it suddenly appeared in the woods to the north of London in vast numbers. It is closely allied to *Cynip gallæ-tinctoriæ*, producing the ink-gall of commerce on *Quercæ infectoria* in the Levant. The galls of the Devonshire species contain a considerable amount of tannin,* making excellent ink, and yielding a good and permanent dye. Like all other insects which multiply rapidly, it is subject to the attacks of a parasite, which contributes to keep its increase within certain limits. This is a beautiful green chalcite, first bred from these galls by Mr. Parfitt, and described by him in the 'Zoologist' for 1856 under the name of *Callimome Devoniensis*. Mr. D'Urban did not think that the galls occasioned much injury to large oaks, but to young trees they are very injurious, frequently distorting the leading shoot, and seriously retarding its growth. They make their appearance on the oaks in this neighborhood early in July, and growing rapidly, reach their full size in August. They are formed on the young shoots of the year, always in the centre of a bud, and are monotholasmous, that is, they contain a single individual only. Some of them produce the flies in September, nearly all being females. The males are remarkably scarce, and have but rarely been obtained. Some remain in the larva state within the gall all through the winter, and emerge in the spring. Few, however, of those hibernating escape the different species of tit, those little birds picking the hard galls to pieces to get at the fat white grub inside. The galls themselves are very persistent, remaining several years on the trees. Those from which the fly has escaped may readily be known by the presence of a single round hole on one side. Mr. D'Urban then explained the manner in which galls are formed, and the mechanism of the instrument with which the gall-fly makes a puncture in the bark of the trunk or shoots, in the young bud, on the leaf, or

* This result of Mr. D'Urban does not accord with the experiments of Dr. Virenn (Linn. Soc. Proceedings, vol. 1st, Zoology, p. 72) and of Mr. Braithwaite (Pharm. Journ. vol. xv. p. 544), both of whom found but a very small amount of tannin in these English galls.—ED. PH. JOURN.

on the peduncles of the flowers, according to the part of the tree selected by a particular species, of which a great many infest the oak.—*London Pharm. Journ.*, from *Gardener's Chronicle*.

ARSENITE OF CAFEINE AND TANNO-ARSENIC ACID USED AS ANTIPERIODICS.

M. Gastinel, Professor at the School of Medicine at Cairo, has presented to the Egyptian Institute two new arsenical compounds—viz., arseniate of caffeine and tanno-arsenic acid, both perfectly crystallized, and having a well-defined chemical constitution. M. Schnepf, sanitary physician at Alexandria, has lately studied the therapeutical action of these two compounds, and the following are some of the cases which he has recorded. The first case was that of a man forty-five years old, who had just had two paroxysms of fever. A cathartic and emetic were first given, and produced vomiting and purging; then on the next morning he took twenty centigrammes of tanno-arsenic acid in some water, in doses of one centigramme every quarter of an hour. This was on the day when the paroxysm was expected to return, but it was almost entirely absent, the patient complaining, however, of a little frontal headache. The dose was repeated on the two following days, and there was no return of the fever, and after a short time the patient entirely recovered. In another case the patient was a man about forty years old, attacked with a tertian fever. On the day when the fever was absent he took twenty centigrammes of tanno-arsenic acid. The paroxysm did not return on the following day, and the arsenical compound was continued for two days longer. The patient complained of loss of appetite for a few days, but soon recovered entirely. The third case was that of a man of fifty years old, suffering from a quotidian fever. The first attack surprised him suddenly in a violent manner, and was attended with great prostration. The next day an emetic was administered, but the paroxysm returned. After the remission, on the third day, twenty centigrammes of the tanno-arsenic acid were

given, and the paroxysm did not return, although some headache remained, with wandering pains in the stomach. Twenty centigrammes more were given, and the fever never reappeared, but there remained a strong dislike for food, and a painful sensation at the epigastrium. Gradually, however, the appetite returned, and the man became quite well.—*Brit. and For. Med.-Chirurg. Rev.*, Jan. 1863, from *Gazette des Hopitaux*, Jan. 1862.

DR. JOULE'S NEW SENSITIVE THERMOMETER.

At the last meeting of the Manchester Philosophical Society, Dr. Joule described a new thermometer of such exquisite sensibility as to be capable of being affected by the heat radiated from the moon. It consists of a glass tube, closed at both ends, two feet in length by four inches in diameter, divided longitudinally by a blackened pasteboard diaphragm, extending to within an inch of the two ends. In the upper space so left, a piece of magnetized sewing needle, furnished with an index, is suspended by a single filament of silk.

It is evident that the slightest increase of temperature on one side will occasion an expansion of the air on that side, which will consequently ascend, and, after passing across and affecting the index, will descend on the other side. So exquisitely delicate is this instrument, that it indicates the heat given out by a pint of warm water at a distance of three yards, and it is also able to detect the heat radiated by the moon; for as a beam of moonlight admitted through an aperture in a shutter was allowed to pass across the instrument, the needle was deflected several degrees, first to one side and then to the other. This instrument, at once so simple and so delicate, promises to be of extreme use in many thermometrical and meteorological experiments, and, in general, in all sciences where the observation of slight difference of temperature is of importance.—*Chem. and Drug., London*, April 15, 1863.

NOTES ON THE EXTRACTION AND ESTIMATION OF
SOME OF THE CRYSTALLINE PRINCIPLES OF OPIUM.

BY R. HAINES, M. B.

Professor of *Materia Medica*, Grant College, Bombay.

(Concluded from page 273.)

Estimation of Morphia.—On this subject an interesting paper was read by Dr. Giraud, in December, 1850, in which the advantages of O'Shaughnessy's process, as giving at one and the same operation the proportion both of morphia and of narcotine, were pointed out. I can, upon the whole, fully join in the praises bestowed upon this method; but, at the same time, I have found that, in the form practised by the author of that paper, it did not quite meet all requirements, especially in regard to the purity of the bases obtained by it. I have been, therefore, induced to make some little modifications, which, I think, leave it in a state as nearly perfect as possible. It will be recollected that the principles upon which it proceeds are: 1st, the solubility of narcotine in a sufficient quantity of cold rectified spirit; and 2d, the strong basic property of morphia, whereby it is capable of decomposing a salt of ammonia when boiled with it, setting the ammonia free, and combining with its acid. The method of proceeding which I have found most advantageous is the following (the quantity of opium to be used is immaterial; if sufficient is at hand, 1000 grains, as recommended by O'Shaughnessy, is a convenient quantity): The opium is broken up into pieces as small as possible, and digested in five times its weight of rectified spirit in a stoppered bottle, with occasional agitation, for a couple of days. The tincture is strained through calico and pressed, and the marc transferred to a flask, which is to be closed with a stopper or glass plate. The calico is washed with half as much spirit as that first used, which is then digested with the opium for twenty-four hours more, after which the flask is placed in a water bath, the cork having been removed, until the spirit begins to boil. It is then removed from the bath, and when cool the liquid is strained through calico and thoroughly pressed out, being washed at last with a few drachms of spirit. In this way a complete exhaustion is effected, any remnants of narcotine being brought into solution at the boiling temperature. The liquid, if turbid, is

filtered through paper, poured into a retort placed in a water bath, and solution of ammonia, in quantity sufficient to destroy completely the acid reaction, is added. Two drachms will be ample for this purpose; the use of so much as one ounce, formerly recommended, is quite unnecessary. If the spirit is very strong, a few drachms of water may be added, and the distillation proceeded with. When four-fifths of the spirit have been distilled off, the retort is removed,* its contents poured into a porcelain capsule, and the retort washed with a small quantity of rectified spirit, which is added to the rest. The capsule is covered and left for twenty-four hours. During the distillation most of the alcohol is driven over, and a weak spirit, much under proof strength remains, in which, when cold, narcotine is scarcely at all soluble. The mass is squeezed through linen, which is better than calico in this case, the crystals of narcotine washed several times with a little rectified spirit, and again pressed.

The liquors are united and mixed with water equal to four times the weight of the opium employed. After twenty-four hours the clear liquid is strained off from the deposited resin, gently evaporated to one-fourth of its bulk, the remainder brought nearly to boiling, and mixed in a beaked tumbler with half its bulk of rectified spirit. Solution of ammonia is then added, until, after blowing away the air in the vessel, the smell of ammonia remains permanently perceptible, or until the air retains an alkaline reaction. In a few minutes flaky crystals of morphia make their appearance, and rapidly increase as the liquid cools. They adhere but little, and sometimes not at all, to the walls of the vessel. It is well, at the expiration of twelve hours, to stir the liquid smartly, which expedites the complete precipitation of the morphia. After twenty-four hours the crystals are filtered off, washed and dried. If they should be very much colored, which is not often the case, they may be dissolved by warming

* It is essential that all the ammonia be driven off, otherwise, on the subsequent dilution of the liquid with water, some of the morphia will be precipitated with the resin and lost. The last portions of spirit should, therefore, be tested, and, if found alkaline, an additional quantity of pure spirit should be poured into the retort, and the distillation renewed until no more ammonia appears in the distillate.

with a little caustic soda or potash, the liquid diluted, filtered, heated, mixed with alcohol, slightly supersaturated with acid, and precipitated as before by ammonia.

The crystals of narcotine are treated with cold caustic soda or potash of the usual strength. This dissolves the adhering resin, but leaves the narcotine unaffected. After some hours, if the crystals are not quite colorless, the liquid may be heated to 180° for a short time, poured off from the crystals, and the operation repeated with fresh solution of soda. The liquid is then diluted with much water, and the narcotine allowed thoroughly to subside. The clear liquid is then poured off, water added, and the narcotine collected upon a paper filter, washed and dried. The strong alkaline liquid clogs the paper too much to render immediate filtration practicable; hence the necessity of separating it, in the first place, by the subsidence of narcotine. The crystals are thus obtained at once and without the trouble and loss of re-crystallization, snow-white, notwithstanding the dark color of the liquid in which they are formed, for the coloring matter is merely superficially adherent; they are also perfectly pure, every trace of morphia being removed by the alkali. The decolorization of morphia is much more difficult, the coloring matter being incorporated with the substance of the crystals. It can only be removed entirely by the use of animal charcoal.

The process, it will be observed, differs from that employed by Sir W. O'Shaughnessy and by Dr. Giraud in the following points:—The extraction of the opium is effected in two macerations instead of one, the last time at a boiling temperature. The quantity of ammonia used is only a third or a fourth of that originally employed. The narcotine is washed with spirit instead of water, the immediate effect of the latter being to throw down quantities of resin upon the crystals in an insoluble form. The narcotine is not dissolved in acid, and re-precipitated by ammonia, which, in reality, does very little towards purifying it. I have repeatedly obtained the narcotine by O'Shaughnessy's process as an almost black resinous mass, adherent to the paper, and totally devoid of crystallization. It is evident, therefore, that the results are not fully to be depended on. By the present method the trouble is less, and the result, as may be seen by the specimens on the table, very satisfactory. As to the morphia, the syrupy liquid which contains it is diluted with less

water, but I find that the quantity I have mentioned is more than sufficient. Instead of adding the ammonia at once to the cold clear liquid, by which a highly impure and resinous morphia is thrown down, the solution is concentrated, mixed with alcohol, and precipitated hot with ammonia. The spirit keeps the resin in solution, and, aided by the effect of heat, retards the separation of the morphia, so that it has time to form distinct crystals. This has been previously pointed out by M. Fordos. The loss of morphia by solution in the spirit is perfectly inappreciable, and is more than compensated by the reduction in the bulk of the liquid by previous evaporation. It is, I believe, an essential step in all precipitations of morphia.

All the processes hitherto recommended had in view merely the estimation of morphia. In addition to the method of Couerbe,[†] commonly known as Mohr's, and the manufacturing process of Gregory,[‡] adopted, but not advantageously, as an analytical one by Berthemot,[§] may be mentioned that of Guillermond,^{||} who precipitates a spirituous solution at once and without concentration by ammonia, and separates the morphia and narcotine mechanically; or the modification of Riegel,[¶] who separates the narcotine from the morphia by treatment with ether; the original one of Robiquet,^{**} who precipitates the aqueous solution by boiling with magnesia, dissolves the precipitate in boiling alcohol, and treats the crystals which form on cooling with ether to dissolve narcotine; that of Thiboméry,^{††} who precipitates hot with ammonia; that of Fordos,^{‡‡} who mixes an aqueous infusion, without previous evaporation, with spirit, and precipitates cold with ammonia, separating the narcotine by washing with ether and chloroform; lastly, that of Merck,^{§§} a most trustworthy and practical experimenter, who evaporates the watery infusion to a small bulk, adds an excess

[†] Pereira's "Materia Medica," 3rd ed., vol. ii., p. 2107.

[‡] Geiger und Liebig's "Handbuch der Pharmacie," band i., s. 1191.

[§] Pereira's "Mat. Med.," *loco cit.*

^{||} Journal de Pharmacie, 3me sie., tome xvi., p. 17; Pharmaceutical Journal, vol. ix., p. 236; Liebig and Kopp's "Annual Report for 1849," English edition, p. 422.

[¶] Pharm. Journ., vol. xi., p. 418.

^{**} Ann. Ph. Phys., 2me. sie., tome v. p. 279.

^{††} Pereira's "Mat. Med.," *loco cit.*

^{‡‡} Comptes Rendus, vol. xxiv., June 15, 1857; Pharm. Journ., vol. xvii., p. 289.

^{§§} Geiger und Liebig's "Handbuch der Pharmacie," band i., s. 1188.

of carbonate of soda, continues the evaporation to dryness, washes with water, then with spirit, and treats the residue with very weak acetic acid as long as it is neutralised, which dissolves morphia only and not narcotine, filters through pure animal charcoal, and precipitates with ammonia.

But, whatever method is adopted, hurry is to be avoided. The thorough extraction of the opium requires time, and too much time, also, can hardly be allowed for the crystallization of the morphia. Filtrations, too, are tedious operations if effectually performed. The use of spirit as the extracting agent is, on the small scale, much preferable to that of water for all purposes of analysis. It brings into solution all the crystalline principles, including the narcotine, and, by leaving undissolved much of the gummy matters, it renders the crystallization and purification more easy and complete. By the process above described, I have repeatedly obtained crystals of morphia half an inch and upwards in length, even when operating upon as little as 300 grains of opium. The morphia is separated by this method with fully as much ease and accuracy as by any other, and certainly by no other means can the entire quantity of narcotine be so readily extracted—a matter of some interest now that the antiperiodic properties of this base are so fully established.

Subjoined are the results obtained by the application of this process to some little-known varieties of opium ;—

No.	Name of Source.	Per Cent.				Remarks.
		Moisture, dried at 220°.	Smokable extract.	Narcot- ine.	Mor- phia.	
Persian :						
1	Shiraz.....	(about) 5.0	62	5.74	5.69	
2	Sheereh (from Isfahan).....	(do.) 6.0	80	6.00	7.67	In muller-shaped cakes.
3	Pooreh (ditto).....	(do.) 7.0	84	4.56	4.46	Ditto.
4	Kerman.....	5.46	65	6.58	10.33	
5	Kazeroon (from Shiraz).....	7.33	78	6.13	6.89	
6	Istehbanat (ditto).....	8.00	73	4.58	6.58	
7	Yezd (in sticks).....	5.30	82	5.89	9.46	In thin sticks wrapped in colored paper.
8	Ditto, in lump.....	10.81	50	5.76	5.18	Thick consistence, mouldy.
Indian:—						
9	Benares, 1850.....	0.33	46	5.32	3.34	
10	Patna, 1850.....	3.33	53	4.90	4.53	
11	Malwa, 1850.....	6.00	58	4.08	5.00	
12	Punjab, No. 1.....	8.73		3.17	4.44	
13	Ditto, No. 2.....	8.67		2.73	9.26	
Chinese:—						
14	Opium from Canton.....	(about) 7.0		7.15	4.63	
15	Smokable Extract, first quality, from Canton. (Qy. Indian opium,.....)	19.09	{ Nearly all soluble in water. }	1.30	11.57	{ Consistence of treacle.

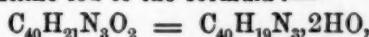
—Lond. Chem. News, Feb. 7, 21, 28, 1863.

ON THE CHEMICAL COMPOSITION OF MAGENTA.

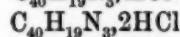
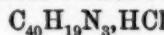
Several different chemists have undertaken the examination of the new coloring matter derived from aniline, and known as Fuchshine or Magenta, with the view of ascertaining its chemical composition and constitution. The results hitherto obtained, however, have been so discordant as to lead to nothing satisfactory. The principal obstacle to success which encountered these experimenters appears to have been the difficulty of procuring the coloring matter in a state of absolute purity, and the readiness with which its properties are masked by the presence of the smallest quantity of foreign matter. Mr. E. C. Nicholson, of the firm of Messrs. Simpson, Maule, and Nicholson, the principal manufacturers of Magenta in this country, has, however, devoted himself to the production of this substance in the pure state, and, from the ample resources at his command, has succeeded in preparing a complete series of perfectly definite compounds in beautiful crystals. The first difficulty being thus overcome, the products were placed at the disposal of Dr. Hofmann, and the results of this distinguished chemist's investigation are now published.

The color magenta, then, consists of a salt, usually the acetate, of a new base or alkaloid, for which Mr. Nicholson proposes the name of *Roseine*, but Dr. Hofmann wishing to preserve a remembrance of its origin, christens *Rosaniline*. It is a remarkable property of this substance, that, while all its compounds possess the magnificent characteristic color of magenta, it is itself colorless. The pure base may be prepared from the acetate, which is the compound generally used in dyeing, by decomposing a boiling solution of the salt with a large excess of ammonia. A crystalline precipitate of a reddish color is thrown down, which consists of the base in a state of great purity. The colorless liquid filtered from the precipitate yields, on cooling, a crop of *perfectly white*, needle-shaped or tabular crystals; these consist of absolutely pure rosaniline. Unfortunately, the extent of solubility of this substance in ammonia, or even in boiling water, is very slight, so that only a very small quantity of the base can be obtained in this absolutely colorless condition. Rosaniline is a little more soluble in spirit; the solution pos-

sesses a deep red color. It is insoluble in ether. Exposed to the air the base becomes rapidly rose colored, and ultimately deep red. During this change of color no variation of weight can be perceived. At 100° C. rosaniline loses a little adherent water, and may then be heated to 130° C. without change; at a higher temperature it decomposes, giving off an oily liquid, principally aniline, and leaving a carbonaceous residue. The analysis of rosaniline led to the formula:—*



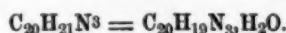
which was confirmed by the examination of its salts and characteristic combinations. Rosaniline constitutes a powerful well-defined base, forming several series of salts, all remarkably crystalline. Dr. Hofmann regards it as a triacid triamine, which is capable of producing three classes of salts.—



At present, however, he has only succeeded in producing the first and last salt, and the great tendency of the base appears to be to form monacid compounds. The salts, with one equivalent of acid, are extremely stable; they may be crystallized four or five times, without in the slightest degree changing. The salts, with three equivalents of acid, have only a slight stability, and are decomposed by the action of water, or a temperature of 100° C. From the formula of the hydrochlorates, it is evident that the white crystals of the base really constitute a hydrate, the salts not containing oxygen.

The mono-salts of rosaniline may be obtained in two ways, either by direct combination with the several acids, or by boiling the pure base with an ammonia salt of the acid. The two methods furnish equally pure salts. The salts with one equivalent of acid, for the most part present by reflected light the green lustre of cantharides' wings. Viewed by transmitted light, the crystals are red, and in large mass almost opaque. The aqueous or alcoholic solutions of these salts possess the magnificent crimson color so well known.

* Dr. Hofmann, using the new equivalents C = 12 and O = 16, writes the formula—

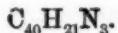


The tri-acid salts, on the contrary, are of a yellowish brown, both in the solid state or in solution, and they are much more soluble in water and alcohol than the mono-acid salts, which are comparatively but slightly soluble.

The mono-hydrochlorate of rosaniline may be prepared either by combining the base with hydrochloric acid, or by boiling it with sal-ammoniac. It deposits from its boiling solution in well-defined rhombic tables, often united into the form of a star. It is difficultly soluble in water, more soluble in alcohol, and insoluble in ether. It is very hygroscopic. This compound is more soluble in moderately diluted hydrochloric acid than it is in water. If the slightly warm solution is mixed with very strong hydrochloric acid, it solidifies on cooling to a mass of magnificent needle-shaped crystals of a reddish-brown color, which must be washed with concentrated hydrochloric acid, and dried over oil of vitriol and lime. These crystals constitute the terhydrochlorate, $C_{40}H_{10}N_3 \cdot 3HCl$. Water decomposes this salt. Heated to 100° it gradually loses its acid; the brown crystals become first of an indigo-blue color, and if heated long enough, pass to the original green mono-salt. The sulphate of rosaniline is easily obtained by dissolving the base in dilute boiling sulphuric acid. It forms green crystals like the chloride. The acetate is perhaps the most beautiful of the series. Mr. Nicholson has obtained it in crystals a quarter of an inch thick. It is the most soluble in water and alcohol.

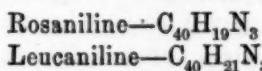
Action of Reducing Agents on Rosaniline.—From rosaniline Dr. Hofmann has succeeded in obtaining another basic substance of a very definite nature, to which he gives the name *Leucanine*. It is obtained by the action of reducing agents, either nascent hydrogen or sulphuretted hydrogen, upon a salt of rosaniline—the readiest method for its production being to digest commercial fuchsine or magenta, with sulphide of ammonium, for some time. A fused mass results, which solidifies on cooling to a brittle scarcely crystalline body, which consists of leucanine. The mass is powdered, washed with water, and dissolved in dilute hydrochloric acid, to separate the sulphur and impurities. Concentrated hydrochloric acid is added to the deep brown solution so obtained, when a crystalline precipitate is thrown down, which is washed with strong acid, and may be

farther purified by again dissolving in dilute acid, heating the solution to the boiling point, and then adding strong acid ; the liquid remains clear; and as it cools, the chloride of leucaniline separates in crystals. These are rectangular tables, well formed, but very small, and of a dazzling white color. They may be recrystallized from water, or dissolved in alcohol, and precipitated by the addition of ether, in which they are perfectly insoluble. The pure chloride furnishes, on the addition of ammonia, leucaniline as a perfectly white powder, which assumes a rose color by exposure to the atmosphere of the laboratory. It is scarcely soluble in water, very soluble in alcohol and scarcely so in ether. It cannot be obtained in fine crystals from these solvents. When heated it becomes red, and at 100° C. fuses to a red transparent liquid. It is anhydrous, its formula being—



Its chloride is tri-acid, and when dried *in vacuo* retains one atom of water. Its formula is $\text{C}_{40}\text{H}_{21}\text{N}_3 \cdot \text{H}_2\text{O}$. It furnishes a beautiful and very crystalline platinum salt having the composition $\text{C}_{40}\text{H}_{21}\text{N}_3 \cdot \text{H}_2\text{O} \cdot \text{PtCl}_2 \cdot 2\text{H}_2\text{O}$.

The salts of leucaniline are in general well crystallized ; they are all very soluble in water, and are precipitated from their aqueous solutions upon the addition of their respective acids. The sulphate is remarkable for the facility with which it crystallizes. It will be seen, by comparing the formula of leucaniline with that of rosaniline, that it only differs from the latter by containing two atoms more of hydrogen.



Dr. Hofmann therefore compares these two bases to blue and white indigo, which, as is known, only differ from each other by two atoms of hydrogen.

Leucaniline is easily changed back again into rosaniline by oxidizing agents. The reaction succeeds perfectly with peroxide of barium, perchloride of iron, or chromate of potash. On carefully heating the colorless solution of the chloride with one of these agents, the fluid rapidly assumes the beautiful crimson color of the salts of aniline.—*Lond. Pharm. Journ.*, May, 1862.

CHEMISTRY OF COMMERCIAL ANILINE.*

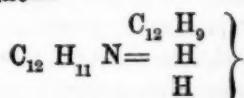
Dr. Hofmann has been engaged in investigating into the nature of the less volatile liquids which are produced during the manufacture of aniline upon the large scale. These liquids commence to boil at 182° C., and the temperature continues to rise, without indicating any fixed point, until the limit of the mercurial range is reached, and it is necessary to remove the thermometer from the retort. Collecting separately that which distils between 200° and 220°, and that which passes over between 270° and 300°, basic oils are obtained, consisting chiefly of toluidine and toluylene-diamine. Separating that which distils above 330°, a thick brown liquid is obtained, which, treated with dilute sulphuric acid, furnishes a crystalline mass, containing two salts,—the one soluble, the other remarkable for its insolubility. The *soluble* sulphate, when separated and decomposed by caustic soda gives a viscid basic oil, which becomes solid in the course of a few days. This, purified by compression between bibulous paper and crystallization from water and from alcohol, furnishes long white silken needles, which are little soluble in water, very soluble in alcohol and ether, fuse at 192°, and distil, without decomposition, at a temperature beyond the range of a mercurial thermometer. This body possesses precisely the same composition as aniline, and is therefore named by Dr. Hofmann *Paraniline*. It forms definite, well crystallized salts, the study of which has indicated that this base should be represented by the formula $C_{12} H_{14} N_2$, that is to say, double that of aniline.

Paraniline is capable of fixing either one or two equivalents of acid. The mono-acid compounds are obtained with great facility; they possess a fine yellow color. Dr. Hofmann describes the sulphate, the nitrate, the hydrochlorate, and the platinum salt.

The *insoluble* sulphate obtained at the same time as the soluble sulphate, by treating the bases distilling above 330° with dilute sulphuric acid, may be purified by boiling with alcohol, in which it is insoluble, and dissolving in very large quantities of

*Dr. Hofmann uses the new equivalents, in which C=12 and O=16, and in this and the following article his formulæ have been retained unaltered.

boiling water, filtering, and crystallizing. To isolate the base, this sulphate is suspended in weak alcohol, and submitted to the action of caustic soda, when a solution is obtained which deposits on the addition of water the new base, in the form of white scales, little soluble in boiling water, very soluble in alcohol and ether, fusing at 45°, and boiling at 322° without alteration. This base has the composition $C_{12} H_{11} N$, and constitutes a primary monamine—



The author proposes for this base the same *Xenilamine* (from *ξ* = stranger), on account of the obscurity of its origin.—*London Pharm. Journ.*

THE CHEMISTRY OF ANILINE COLORS.

It will be remembered that some time back* Dr. Hofmann made a most interesting investigation into the nature and composition of magenta, and succeeded, through the instrumentality of Mr. E. Nicholson's manufacturing skill, in demonstrating that this magnificent dye really consists of a salt of a new base to which he applied the name of *Rosaniline*. From rosaniline he at the same time obtained another and homologous base, which was christened *Leucaniline*. Mr. Nicholson has since placed in the hands of this distinguished investigator a yellow coloring-matter, which is obtained as a secondary product in the manufacture of rosaniline. This body communicates a golden-yellow tint to silk and wool; it occurs in the form of a yellow amorphous powder, resembling chromate of lead; it is difficultly soluble in water, but very soluble in alcohol and ether. This substance constitutes another well-defined base, giving two series of readily crystallizable salts. Dr. Hofmann proposes to designate this base *Chrysaniline*. Its most characteristic compound is the proto-nitrate, which is sparingly soluble in water; treated by ammonia it furnishes pure chrysaniline, which when dried at 100° C., has the formula $C_{20} H_{17} N_3$.

* See page 342 of this number.

Hydrochlorate, $C_{20} H_{17} N_3 2H Cl$.—This salt occurs as a scarlet crystalline precipitate, formed of scales, which are very soluble in water, less soluble in alcohol, almost insoluble in ether. When maintained during fifteen days between 160° and 180° C., it is changed into a yellow powder, which constitutes the mono-acid hydrochlorate $C_{20} H_{17} N_3, H Cl$.

Nitrates.—These are magnificent salts, crystallizing easily in needles of a ruby-red color, and remarkably insoluble in water. A dilute solution of nitre (containing 1 gramme of nitric acid to a litre of water), when mixed with a moderately concentrated solution of a salt of chrysanieline, gives a crystalline precipitate so readily, that this base may serve as a reagent for the detection of nitric acid. The two nitrates have the formulæ respectively of $C_{20} H_{17} N_3 HNO_3$ and $C_{20} H_{17} N_3 (HNO_3)_2$. It is difficult to obtain the one of these free from small quantities of the other.

Sulphate.—Very soluble; crystallizes with difficulty.

Platinum salt.—Crystalline scarlet precipitate, which is deposited in very fine large tables, containing a mixture of the mono-chloroplatinic and the dichloroplatinic salts, fixing more or less water of crystallization.

The composition of chrysanieline establishes a direct relation between this substance and rosanieline and leucanieline:—

Chrysanieline	$C_{20} H_{17} N_3$.
Rosanieline	$C_{20} H_{19} N_3$.
Leucanieline	$C_{20} H_{21} N_3$.

The first is mono-acid or diacid; the second is mono-acid or triacid, but it possesses a very decided tendency to function as mono-acid; the third forms exclusively triacid compounds.—

London Pharm. Journ., May, 1863.

THALLIUM IN FURNACE PRODUCTS.

BY W. T. ROEPPER.

(Communicated in a letter to Prof. Geo. J. BRUSH.)

In examining before the spectroscope some of the dust deposited by the tunnel-head flame on the boilers of the Bethlehem Iron Works, a sharp, bright green line flashed up midway be-

tween the green calcium and Ba α line, which, judging from Crookes' description, appeared to be the thallium line, a conjecture which Prof. Brush verified by comparison with some of Lamy's chloride of thallium. The line appeared at 90° on the scale of the instrument, sodium being at 60° and the red and violet potassium lines respectively at 7° , and 226° . In addition to the above lines, the spectra of sodium, potassium, lithium and calcium are distinctly displayed by this dust. Thallium and the alkalies seem to exist in the dust, at least in part, as sulphates, which can be extracted by water. Similar dust from one of the other furnaces along the Lehigh gave the same results; hence it is not unlikely that thallium is a common product of the anthracite furnaces, and is perhaps derived from the pyrites accompanying the coal, though Crookes found the non-cupriferous pyrites to be almost free from this element.*

It is only the dust which remains lying on the boilers, or is deposited on the iron doors or shutters of the boiler-chamber, which gives the thallium reaction, while that which has fallen to the floor does not show it. The reason probably is, that it is volatilized by the higher heat of the flame, and escapes through the chimney as soon as it is removed from the comparatively lower temperature of the steam and the outer doors, which seem to act as condensers. I have not been able to detect it in the ashes of anthracite from a common stove, while they beautifully display the sodium, potassium and lithium lines.—*Amer. Jour. of Science and Arts, May, 1863.*

Bethlehem, Pa., April 8, 1863.

VEGETABLE PRODUCTIONS OF THE FEEJEE ISLANDS.

A "Blue Book," entitled "*Correspondence relative to the Fiji Islands*," May, 1862, gives a full and official account of the arrangement between the British Consul, Mr. Pritchard, and *Ebenezer Thakombau*, claiming to be king of the Fiji Islands, for the cession of the latter to the British crown, and of the appointment of Col. Smythe as a commission to visit these islands.

* Mr. Crookes has recently announced that he has found thallium in comparatively large quantities in the deposit from the flues of Mr. Spence's pyrites burners at Manchester.—*Chem. News*, vii, 150.—G. J. S.

and to report whether the acquisition would be desirable,—whereupon the commissioner visited the islands, accompanied by Dr. B. Seemann, who was instructed to explore and report upon their vegetable productions and resources. Col. Smythe very sensibly reported that Thakombau, although perhaps the most influential of the independent chiefs, had no claim to the title of king of Fiji, and that it was inexpedient to accept his offer. What most interests us is the appendix, containing Dr. Seemann's elaborate Report on the Vegetable Productions and Resources of the Vitian or Fijian Islands. This treats, 1, of the climate, soil, and flora in general of these islands; and, 2, of the Colonial Produce, so-called, such as sugar, coffee, tamarinds and tobacco, which they may be expected to yield, as also certain oils and fats, farinas, and spices. 3. The staple food of the people. This "is the same all over Polynesia, being derived, with the total exclusion of all grain and pulse, from the yam, the taro, the banana, the plantain, the bread fruit, and the cocoa-nut; but the bulk of it is furnished in the different countries by only one of these plants. In the Hawain group the taro takes the lead, whilst the cocoa-nut is looked upon as a delicacy, from which the women were formerly altogether cut off. In some of the smaller coral islands the inhabitants live almost entirely upon cocoa-nuts. The Samoans place the bread-fruit at the head of the list. Again, the Fijians think more of the yam than of the others, though all grow in their islands in the greatest perfection, and in an endless number of varieties." Of edible fruits there is a long list, the bread-fruit and bananas being the most important, and the account of the *Ivi*, (*Inocarpus edulis*), is the most interesting, now that its botanical relationship has been detected by Mr. Bentham. 4. *Cannibal vegetables*, the vegetables eaten with human flesh,—formerly an important part of Fijian dietetics, and not yet entirely obsolete,—form the subject of a separate section. Human flesh, it appears, is extremely difficult to digest, and, perhaps on this account, was eaten with the leaves of three vegetables which were thought to assist the process, viz: of *Trophis anthropophagorum* and *Solanum anthropophagorum* of Seemann, and of *Omalianthus pedicellatus*, Benth., an Euphorbiaceous plant. 5. *National Beverages*. Like the other Polynesians, they prepare an in-

toxicating drink from the root of *Piper methysticum*. "In order to prepare the beverage, it is necessary to reduce the roots to minute particles, which, according to regular Polynesian usage, is done by chewing,—a task, in Fiji, devolving upon lads who have sound teeth, and who occupy a certain social rank towards the man for whom they perform the office. . . . Some Fijians make it a point to chew as great a quantity as possible in one mouthful; and there is a man of this sort at Veratra, famous all over the group, who is able within three hours' time to chew a single mouthful sufficient to intoxicate fifty persons." Although the Fijians drink the natural liquor of young cocoanuts, they were not acquainted, nor were any Polynesians acquainted, with the art of extracting and fermenting toddy from the cocoa-nut palm. From which it is inferred, that, if the Polynesians are of Malayan origin, they must have left the cradle of their race before the extraction of toddy from the cocoa-nut tree, or even the tree itself, was known there. Indeed, this palm itself is thought to have made its way by the drifting of its fruits across the Pacific from east to west, through the Polynesian Islands, and to have reached Ceylon within what may be called historical times. 6. *Vegetable Poisons*. Under this head is an interesting account of the kau-karo (literally Itch-wood), the *Oncocarpus Vitensis*, A. Gray, which acts like the Poison Rhus of North America and of Japan, only with tenfold virulence. Indeed, a drop of the juice, falling upon the hand of one of Dr. Seemann's companions, "instantly produced a pain equal to that produced by contact with a red-hot poker." The *Excoecaria agallocha*, known through the East, is equally virulent with its ally the Manchineel tree. The smoke of the burning wood is used by the Fijians to cure leprosy,—a terribly severe, but sometimes an effectual, remedy. 7. *Medicinal Plants*. None of real importance are brought to light. 8. *Scents and Perfumes*. These are used for scenting the cocoanut oil which the natives profusely apply to the hair and to the naked body. Besides that obtained from several flowers, from the fruit of *Parinari laurinum* and of *Eugenia (Jambosa) neurocalyx*, A. Gray, and from the bark of a species of *Cinnamomum*, the most famous is that yielded by the Sandal-wood of the islands, which, formerly abundant at Sandalwood Bay, is

now almost annihilated. 9. *Materials for Clothing.* The *taba*, made of the bark of the Paper Mulberry, mainly furnished what scanty clothing was needed, until the introduction of cheap cotton cloth by traders. Successive sections discourse of *Fibres used for cordage*; of *Cotton*, several sorts of which have been introduced and run wild in these islands, and the better sorts are now cultivated with success; of *Timber*, the most important being a kind of kowrie-pine or *Dammara*, and *Calophyllum inophyllum*. The wood of the latter, abundant by the sea-side, is used for canoes and boats, while its seed yields an important oil, but the most valued wood is that of *Afzelia bijuga*, A. Gr., which is almost indestructible. *Palms, Sacred Groves, Ornamental Plants, &c.*, occupy the remaining sections.

Having submitted his economical report, Dr. Seemann is now turning his attention to the scientific botany of the Feejee Islands, where he made a collection second in extent and interest only to that of the U. S. Exploring Expedition under Commodore Wilkes. The *Flora Vitiensis* which he has announced as in preparation, is to be a royal quarto volume of about 400 pages of letter press, and 100 colored plates by Mr. Fitch,—to be published by Lovell Reeve & Co. In form and extent it will therefore equal his well known Botany of the Voyage of the *Herald*; and it cannot fail to be interesting and important.

—*Amer. Jour. of Science and Arts, May, 1863.*

ON THE QUESTION WHETHER DIATOMS LIVE ON THE
SEA-BOTTOM AT GREAT DEPTHS.

BY WM. STIMPSON, M. D.

In a paper on the Diatomaceæ found in mud collected at great depths from the bottom of the sea off the coast of Kamtschatka, in soundings made by the North Pacific Expedition under Com. Rodgers (see *Am. Jour. Sci. & Arts*, [2], xxi, 284), the late lamented Prof. Bailey made the following remark: "The perfect conditions of the organisms in these soundings, and the fact that some of them retain their soft parts, indicate that they were very recently in a living condition, but it does not follow that they were living when collected at such immense depths." My attention has recently been called to this subject by the

perusal of an account of the recent discoveries of animal life in various forms at depths vastly greater than had been previously suspected; for instance, at 1400 fathoms by Torell, at 1000 and 1500 fathoms by Milne-Edwards, and at 3000 fathoms by Dr. Wallich. The question of the nature of the food of these abyssal animals is one of great interest, and I wish to place on record, in advance of the publication of the report of the expedition, the results of my examination of the specimens alluded to by Prof. Bailey, when they were freshly taken from the water.

In the sounding taken at the depth of 2700 fathoms, in lat. $56^{\circ} 46' N.$, long. $168^{\circ} 18' E.$, Lieut. Brook used, for the armature of his lead, three quills, each about three inches in length, fastened together, and placed in such a position that when the lead struck the bottom the quills would be forced perpendicularly into it, and thus become filled with mud from a stratum a few inches below the general surface of the sea-bottom. The experiment was successful; the quills coming up compactly filled with mud of the usual character occurring at such depths in such latitudes. One of the quills having been submitted to me for microscopic examination, was carefully wiped and cut in two at the *middle*, in order to secure for examination a specimen, as nearly as possible free from any chance admixture from the water near the surface. In this specimen I found an abundance of diatoms, some of which, apparently *Coscinodisci*, appeared to me to be undoubtedly living, judging from their fresh appearance and the colors of their internal cell contents.

It is exceedingly doubtful whether sufficient light can penetrate to so great a depth to afford the stimulus which these vegetable organisms are supposed to require for their existence and multiplication. On the other hand, it is by no means certain that some amount of light does not so penetrate, and, if we deny the existence of vegetable life in these abysses, it will be difficult to account for the existence there of animals, which must, ultimately, derive their sustenance from the vegetable kingdom. The supply which they might obtain from the dead bodies of those organisms which die at the surface, and slowly sink through two or three miles of water to the bottom, seems

totally insufficient, for Dr. Wallich has proved that the animals, starfishes for instance, not only exist at those depths, but exist in great numbers. We would call the attention of those who may have an opportunity of obtaining specimens of the bottom at great depths, to the great importance of a microscopic examination of these specimens as soon as taken from the sea. Fresh water should, of course, be used in spreading the mud upon the slide.—*Am. Journ. of Science and Arts*, May, 1863.

ON THE DECOMPOSITION OF CHLORATE OF POTASH AT
A LOW TEMPERATURE, IN PRESENCE OF PEROXIDE OF
MANGANESE.

BY M. E. WIEDERHOLD.

The author set himself to study the catalytic decomposition of chlorate of potash in presence of oxides of manganese and copper. Contrary to M. Schonbein's hypothesis, he found that oxygenated bodies are not the only ones capable of determining this decomposition; for spongy platinum he found induced the same effect.

An intimate mixture of two parts of chlorate of potash and one part of artificial peroxide of manganese begins to disengage oxygen between 200 and 205°; and this phenomenon takes place with the same proportions of chlorate mixed with oxide of copper at 230°; with platinum black, or natural peroxide of manganese at 260 to 270, and with peroxide of lead at 280—285°.

The author believes that the action of these bodies is most likely due to their great power of absorbing heat, and in part also to the relative volume of the catalysing substances.

An interesting fact observed by him is the rising of the temperature of the mixture when the metallic bath wherein the retort is plunged reaches 250° for the mixture of chlorate and peroxide of manganese, and 290 for that of chlorate and oxide of copper.

In none of these decomposition is perchlorate of potash produced.—*Chem. News, Lond.*, April 4, 1863, from *Poggendorff's Annalen der Physik und Chemie*, vol. cxvi., p. 171.

ON THE ESTIMATION OF NITRIC ACID.

By M. H. ROSE.

M. F. Reich has shown that pulverised quartz expels nitric acid from nitrates, especially from alkaline nitrates, at a barely visible red heat. This reaction may be utilised in estimating nitric acid by difference; for which purpose the nitrate is heated with four or six times its weight of powdered quartz.

It is better to use quartz than bichromate of potash, because the mass calcines without melting, and there is no fear of its projecting pieces of the mass. The presence of chlorides and sulphates are no inconvenience; nitrates only are decomposed. Amorphous and crystallised silica behave in almost exactly the same way.

Silica may be replaced by bichromate of potash in the estimation of carbonic acid; to expel all the carbonic acid a higher temperature is necessary than that required for the decomposition of nitrates; however, the red heat produced by Bunsen's simple gas jet is sufficient.—*Chem. News, Lond.*, April 4, 1863, from *Poggendorff's Annalen der Physik und Chemie*, vol. cxvi., p. 635.

THE EFFECTS OF SULPHURET OF CARBON ON HEALTH.

The symptoms caused by sulphuret of carbon are peculiarly severe, and the situation of the workers really most miserable. Few of the workers marry, as it is well known that those who habitually work among these fumes rarely or never have children, and the malady is one which will only succumb to good air and rest, and total exclusion from the work-sheds. The head is much affected, and partial insanity is far from uncommon. The sight is troubled frequently. The taste is vitiated, so that most things appear to taste of sulphur. The hearing is likewise affected, and the digestive functions are sometimes strangely excited, though this latter symptom is less frequent than the others. Appetite is increased to the verge of gluttony, and nausea is almost invariable. The breathing and the circulation are injured, and most, if not all, of the secretive functions are disordered in a very alarming manner. In fact, the wretched people—we can

give them no other name—who work with this agent are miserable to themselves and the world; they live in pain and trouble of both body and mind, with no hope or expectation of cure so long as they continue at their particular occupation. As to the remedies to be taken for alleviation of these misfortunes, baths, good air, a few simple medicines, and a country life—of course necessitating total abstinence from the poisonous works—have been found most efficacious. The power and density of the fumes may be better appreciated, when we state that in many cases the sheds are merely roofs supported by poles, and open to every breeze or gale that blows. M. Delpech does not appear to propose any method for ameliorating the condition of the workpeople. He mentions that the injury is due entirely to sulphuret of carbon; not to the chloride of sulphur; and says that phosphorus has had a beneficial effect in many cases of “depression.” In fact, it would, we suppose, be almost impossible to do anything except abolish the process, and as this cannot be effected, it only remains for scientific men to discover some agent which will produce the same results in the arts, without any of the great and certain dangers of sulphuret of carbon. There are many minds at work on this project, but as yet no practical result has been secured.—*Chemical News, London, May 2, 1863, from Social Science Review.*

ON THE PREPARATION OF ASSAFŒTIDA, ETC.

BY BARNARD S. PROCTOR.

The fetid gum resins, assafœtida, galbanum, and sagapenum, are directed by the *Pharmacopœia* to be prepared for medicinal use by boiling in a sufficient quantity of water to cover the lumps of gum, and, when mixed and strained, evaporating till the gum becomes hard upon cooling. There could scarcely have been devised a process more likely to deprive them of their odor and medicinal properties, which reside in great measure, if not entirely, in the essential oil.

Had we desired to produce aqua fœtida, we should have proceeded in the same manner, only condensing the vapors given off from the mixed assafœtida and water, and would reasonably have expected to find the distillate possessed of the medicinal

properties of the drug operated upon ; which expectation is justified by the fact that the essential oil, which constitutes about 3 to 6 per cent. of assafetida, readily passes over with the vapor of boiling water, and, like the other essential oils, has considerable solubility. The quantity of active matter thus abstracted must be much greater in proportion than the impurities which the process is designed to remove. The present Pharmacopœia, in various of its formulæ, directs the use of these prepared gums, to the exclusion of the drugs in their natural state ; it would have been much better to have directed that all samples of these articles, depending for their activity upon the volatile matters they contain, should be rejected if so impure as to require subjection to this questionable process of improvement.

Powdering and sifting will separate a considerable proportion of the ordinary impurities ; but powdering is troublesome on account of its requiring a frigid temperature, unless the material has been subjected to a process of desiccation, almost as objectionable as melting and straining.

The friability of this class of bodies is much increased by the addition of a small proportion of calcined magnesia,—so much so, that they may be readily powdered at ordinary temperatures ; and the powder, when obtained, has not that great tendency to agglomerate which is so troublesome in assafetida, &c. Several samples of these gums upon which I have experimented have required from 4 to 10 per cent. of magnesia to produce the requisite degree of brittleness. The gums may be softened by water-bath heat, and the magnesia stirred in ; when sufficiently mixed, and allowed to cool, they may be readily powdered.

The powder thus obtained has the full odor of the crude drug ; and though, if disposed to be hypercritical, we might say that it was adulterated, it is doubtless a better preparation than that of the P. L.

Pulv. pil. galbani co. is a desideratum at the dispensing counter, and may be readily prepared with powders obtained as above. Supposing the galbanum, sagapenum, and assafetida each to contain 5 per cent. of magnesia, the formula would stand thus :—

Pulv. Galbani c. Magnes.	3ii.	gr. vi.
“ Sagapeni c. Magnes,	3iii.	gr. ix.
“ Assafœtidæ c. Magnes.	3i.	gr. iii.
“ Myrrhæ	3iii.	
“ Saponis	3ij.	

The proportion of the gums in this powder are as near as need be the same as in the *Pharmacopœia* pill mass, the magnesia taking the place of the treacle; consequently, when required for dispensing with essential oils or soft extracts, an equal quantity of it may be used in place of the mass prescribed.

If a pulv. pro pil. galb. co. is required, the same formula, omitting the soap, will produce it, all that is required being the addition of the soft soap and treacle when the mass is wanted; the small quantity of magnesia present being more than compensated for by the superior quality of the powders obtained by its use.—*Chemist and Druggist, London, April 13, 1863.*

ACTION OF SULPHURIC ACID UPON LEAD.

Messrs. T. Crace Calvert and R. Johnson have lately been engaged upon a series of experiments to ascertain whether the opinion generally held respecting the diminished action of acids on metals in proportion to their purity is really correct or not as regards lead. They justly thought that it might be interesting in a scientific point of view, as well as practically useful to study the action of acids, and especially that of sulphuric acid, upon some of the leads of commerce, which, as is well known, are largely employed, in the construction of those immense chambers in which sulphuric acid is manufactured. The results of their experiments leave no doubt that the purer the lead, the more it is attacked. “The experiments,” to quote the words of the authors, were all repeated many times; we varied the surfaces of lead, the quantities of acid, the temperature, the duration of action, and, in fact, all the conditions of the experiments; and yet we always obtained similar results, from which we draw the following conclusions:—

First, and this is the principal point to which we invite the attention of scientific as well as practical men. Of the various kinds of lead existing in commerce, the purer they are the more

they are acted upon by the sulphuric acid. Lead chemically pure is more acted upon than any of the others.

2. Although it is stated in many chemical works that sulphuric acid only acts sensibly upon lead at a temperature above 388° , our experiment tend to prove the contrary, since we find that acid of sp. gr. 1.842 dissolves *cold* 67, 134, and even 201 grammes of lead per square metre of surface; and, in another instance, that acid of sp. gr. 1.705 takes from the same surface 54, 56, and 59 grammes of lead at a temperature of about 120° only.

3. Finally, the action of sulphuric acid upon lead appears, at least when there is no continuous agitation of the mass, not to increase in proportion to the quantity of acid employed. This is probably due to the formation of a layer of sulphate of lead, which protects to a great extent the surface from further action by the acid.*

The analyses made appear to point to *tin* as the metal which enables the impure lead to resist the action of sulphuric acid. To discover whether tin is really the protecting metal, and in what proportions it should exist in the mixture, is the object of a new set of experiments upon which the authors are now engaged.—*Chemist and Druggist, London, April, 15, 1863.*

OXALIC ACID FROM SAWDUST.

At the last Pharmaceutical Meeting, Edinburg, Dr. Murray Thomson, F.R.S.E., read a paper on Mr. Dale's new method for the manufacture of oxalic acid.† The idea of making oxalic acid by acting on sawdust with an alkali was not quite new on the part of Mr. Dale, as in 1829 M. Gay-Lussac published a memoir, in which he announced that M. Vauquelin had converted pectic acid into oxalic acid, by heating the former along with caustic potassa in a crucible. M. Gay-Lussac followed up this discovery by a number of experiments, in which he demonstrated that when a number of substances were treated with potassa they yielded oxalic acid. Among the substances he tried were cotton,

* *Mechanic's Magazine.*

† *Reported in Pharm. Journal.*

sugar, starch, and gum. Any of them, when heated with caustic potassa or soda, gave off hydrogen gas, while the mixture charred; and at length oxalate of potassa or soda was found in the black residue, and could easily be dissolved out of it.

Gay-Lussac tried a number of the vegetable acids, and showed that these might be converted into oxalic acid without charring of the mixture ensuing, and on that circumstance he tried to form an explanation of the process.

But although the memoir of Gay-Lussac had been published for twenty years, no one had proposed using it as a source of oxalic acid on the large scale until Mr. Dale did two or three years ago. And although Gay-Lussac was the first to broach this method of making oxalic acid, it must not be thought that his memoir showed a way by which this result might be obtained free of obstacles; for Mr. Dale found that there was more than one practical difficulty to be overcome before he reached a successful issue. One of the chief of these was that Mr. Dale did not find the sawdust, when heated with caustic soda, was converted into oxalate of soda, as Gay-Lussac would imply. He says that soda or potassa may be used indifferently, but Mr. Dale found that with soda sawdust yielded almost no oxalic acid; while, on the other hand, he was precluded from using potassa on the large scale on account of its high price, though he was quite successful when he used it. At last this difficulty was overcome by using a mixture of soda and potassa, in the proportion of two equivalents of the former to one of the latter; and this, it was found, was as effective as potassa alone. The practical details of the process are as follows:—

1. The alkalies, mixed in the above proportion, are dissolved, and the solution evaporated until of specific gravity 1.35; sawdust is now stirred in until a thick paste results.

2. This paste is then heated on iron plates, during which it is constantly stirred; water is first given off; the mass then swells; inflammable gases, hydrogen and carburetted hydrogen are evolved, along with a peculiar aromatic odor. When the temperature has been maintained at 400° for one or two hours, this stage of the process is complete; the mass has now a dark color, and contains only 1 to 4 per cent. of oxalic acid, and about 0.5 per cent. of formic. The bulk, therefore, of the

mass at this stage consists of a substance whose nature is not yet known, but which is intermediate between the cellulose and oxalic acid.

3. The next stage consists in a single extension of the last, in which the mass is heated till quite dry, care being taken that no charring takes place. It now contains the maximum quantity of oxalic acid, 28 to 30 per cent.

4. This oxalic acid is now combined with both potassa and soda in the grey powder resulting from stage 3. This powder is now washed on a filter with solution of carbonate of soda, which seems to have the singular and unexpected power of decomposing the oxalate of potassa, and converting it into oxalate of soda. At all events, it is quite true that all traces of potassa are washed out with the solution of carbonate of soda. The only explanation that occurs to account for this unusual decomposition is that oxalate of soda is a more insoluble salt than oxalate of potassa, and therefore may be formed by preference.

5. This oxalate of soda is now decomposed by boiling milk of lime. Oxalate of lime falls as a precipitate, and soda remains in solution. This soda is boiled down, and again made use of with fresh sawdust. This recovery of alkali is also practised with the potassa salt which filters through in the last stage.

6. The oxalate of lime is now decomposed in leaden vessels with sulphuric acid. Sulphate of lime is precipitated, and oxalic acid is in solution, which is now evaporated, and the acid separates in crystals, which now need only to be recrystallized to make them quite pure, and fit the acid for all the purposes for which it is employed.

By this ingenious process 2 lbs. of sawdust are made to yield 1 lb. of oxalic acid, and the amount of acid which can be turned out in a week amounts to 9 tons; but the works of Messrs. Roberts, Dale & Co., (near Manchester) could make nearly double that amount. This amount is more than half of all the oxalic acid which is reckoned to be used all over the world. The process also has so much cheapened the price of oxalic acid, that in 1851 it sold for 16d. per pound, and now it only costs from 8d. to 9d. per lb.—*Chemist and Druggist, London, April 15, 1863.*

DISINFECTANTS AND THEIR APPLICATION TO THERAPEUTICS.

Conclusions from facts contained in a memoir upon this subject published in *Archives Générales*, by O. REVEIL, Professeur agrééé à la Faculté de Médecine et à l'école supérieure de Pharmacie, &c., &c.

1st. That there probably exist many kinds of putrid fermentations, varying in their causes as in their effects;

2d. That there is no general disinfectant capable of being indiscriminately used in all cases;

3d. That liquid disinfectants are always preferable to others, other things being equal, when applied in therapeutics.

In their application to this purpose regard should be paid to their cost, the facility of their employment and the inconveniences they may cause by corroding, soiling or rendering unserviceable the linen dressings.

4th. The best disinfectant is that which possesses the following properties :—it should—A. Instantly destroy or mask bad odors ; B. Absorb the liquid or gaseous products of the putrefactive or inflammatory process, remove them by washing, and destroy the poisonous or irritating action of morbid liquids and mephitic gaseous products ; C. Hasten the cicatrization of sores, by giving the necessary vitality for the reparation of the tissues.

5th. Chlorine and solutions of bromine and iodine appear to best fulfil the most important of these conditions.

6th. Chlorine, or at least the hypochlorites, by reason of the gaseous state of their active principle, ought always to be preferred when it is desired to destroy miasm and disinfect the air.

7th. The addition of odorous essences, and principally of nitro-benzine to the hypochlorites and to iodine and bromine water, acts both to mask the disagreeable odors and to set into immediate operation the chemical action.

8th. Tar and coal-tar preparations are able to render effectual service, but they do not possess the property, like iodine and bromine, of destroying the poisonous action of morbid products and putrefaction, or that of various kinds of virus.

9th. *Charpie carbonifére*, and especially *charpie carbonifére iodée*, may be often employed with success.

10th. Carbon, in addition to its absorbent properties, appears to exercise *an action of special contact*, in virtue of which it hastens the destruction of organic matters, or rather, as M. Stenhouse states, according to the experience of Turnbull and Turner, by condensing the oxygen of the air, and thus acting as spongy platinum.

11th. Metallic solutions (salts of iron, zinc, &c.), although imperfect disinfectants, suffice in a great number of cases.

12th. Physical and mechanical agents (ventilators, &c.) may be made powerful aids to chemical disinfectants.

13th. There are some causes of *infection* which appear to resist all treatment (ozzena, otitis, &c.)

14th. We should add, moreover, that there are causes of *infection* which it would be dangerous to suppress (*sueur infecte des pieds*), and the odor of which we should endeavor to mask.

One is struck with admiration on reflecting upon the processes which nature employs to disseminate, transform and reproduce organic matters; in the presence of the grandeur of these facts we remain convinced of the exactitude of the aphorism of La-voisier:—" *Dans la nature, rien ne se perd, rien ne se crée.*" — *Boston Med. and Surg. Journ.* May 14, 1863.

MEDICATED CIGARETTES.

By W. E. BOWMAN, M. D.

Cigarettes may be made of almost any variety of thick paper, but that kind should be selected that on burning yields a smoke most easily inhaled. I have always employed the heavy paper used for copy book covers (olive pressings); thick blotting paper however makes a good cigarette, but the regular filtering paper does not answer, as its smoke is dense and suffocating.

First, cut the paper into strips about seven inches long and an inch and a quarter wide, and next ascertain exactly how much fluid it requires to saturate 25 of these pieces. This is readily done by soaking them in an exactly measured ounce of water, when on withdrawal it will be found that above five fluid drachms of the liquid has been imbibed, this will give the key to the strength you are to make the solutions.

Next saturate the slips with the remedy, and when nearly dry, gum or paste one border of each and roll it around a pencil; afterwards withdraw the pencil, and the cigarette is made.

Arsenical Cigarettes.—Boil 25 grains of arsenious acid (the lump broken up is purest) in a Florence flask with four ounces of water, down to the quantity required to saturate 100 slips of the paper previous to rolling. They will then contain a quarter of a grain each. If you have not the usual apparatus, hang the flask above some live coals by means of a wire.

Mercurial Cigarettes.—Dissolve three drachms of red precipitate, in three drachms of nitric acid, and add enough water to make up the quantity requisite to saturate 100 slips of paper. They will contain about three grains of the nitrate of mercury.

Nitre Cigarettes.—Dip the paper in a saturated solution of the nitrate of potash, before rolling.

Balsamic Cigarettes are made by giving the dried nitre cigarettes a coating of tincture of benzoin.

In the British Medical Journal, Dr. Nevins of the Royal Infirmary School of Medicine, Liverpool, speaks highly of these cigarettes in a number of cases.

Aphonia.—A patient who could not speak above a whisper for over a year, probably due to a thickened condition of the chordæ vocales, as she had no pain or constitutional symptoms, used the mercurial cigarettes for a month, and perfectly recovered.

Offensive Discharges from the Nostrils, with a sense of uneasiness in the frontal sinuses, was quite cured in about a month with the mercurial cigarettes. The patient held his nose after taking a mouthful of the smoke, and then forced it into his nostrils in the manner practised by accomplished smokers.

Polypus in the Nose.—A patient who had been twice operated upon for polypus, is now able to keep the disposition to form fresh polypi in check, by smoking the mercurial cigarette in the same manner, when he feels that uneasiness which warns him of the danger of its recurrence.

Deafness.—When dependant upon an obstructed Eustachian tube, he finds the nitre cigarettes, made with brown paper, most successful, and that the smoke forced into the tympanum from the throat, gradually restores the sense of hearing. The circum-

stance which first led him to adopt this method, was hearing a deaf person on one occasion remark, that when he was sneezing the day before, he heard perfectly ; the violent effort appeared for the moment to have dilated the Eustachian tube, and hearing was the result. He says, that in a deafness of seven years standing, he had benefitted a patient more by this treatment than by any other.

Phthisis.—Trousseau long ago, recommended a puff or two of an arsenical cigarette twice or three times a day in phthisis.

When the attention of the profession has been duly aroused to this subject, there will doubtless be found many other affections in which medicated cigarettes may be advantageously employed, as in syphilitic ulcerations of the throat, ozaena, offensive breath, obstruction of the lachrymal duct, diphtheria, &c. &c.—*Canada Lancet*, May 15, 1863.

ON THE SUPPLY OF QUININE, AND THE CULTIVATION OF CINCHONA PLANTS IN INDIA.

BY CLEMENT R. MARKHAM,

The gentleman specially charged by the British Government with the introduction of these valuable plants into that country.

The original paper is too long and detailed to be transferred to our pages in its entirety, but we shall give an abstract of the most important items of information contained in it. Mr. Markham commenced by advertizing to the inestimable benefits accruing to the inhabitants of almost every portion of the civilised world from the use of the cinchona alkaloids as febrifuges. The lecturer then gave a detailed account of the districts especially fitted by Nature for producing this genus of plants. It extends along the line of the Cordilleras of the Andes for a distance of 1740 miles of latitude on each side of the equator, and passes through four of the South American Republics, namely, New Granada, Ecuador, Peru, and Bolivia, beyond which regions the cinchona plant has not as yet been found growing naturally. The result of the certainty of possessing so close a monopoly has been most disastrous. The inhabitants of these countries appear to have rivalled each other in their reckless destruction of the trees for the sake of their bark with a

view to immediate profit only, no system of cultivation or plantation having ever been so much as thought of. Commencing with the northernmost portion of the bark region in New Granada, Mr. Markham states that wild work has been going on there for many years past, the destruction of the trees of the most valuable kinds having become so general, that in 1855 the supplies began to fall off, and although, on account of the last civil war, the forests have had a respite, and small cargoes of bark are beginning to be exported once more from Cartagena, still in a few years the supplies will once more fail. The once invaluable forests of Ecuador on the western slopes of Chimborazo, and on the Loxa mountains, are actually extirpated, fulfilling the prophecies of Condamine and Ulloa, who warned the bark collectors that they were killing the goose with the golden eggs. Even in Humboldt's time the work of destruction had so far progressed that the original variety of the plant first discovered by Condamine, and sent by him to Linnæus, had almost disappeared. The once large forests of the *Cinchona succirubra*, or "red bark" of commerce, are almost entirely devastated, and, on the authority of Mr. Spruce, the botanist, who accompanied Mr. Markham to that district, it is stated that little or no red bark will be exported from that country during the present year. Peru, the very country which gave the name "Peruvian bark" to this invaluable medicament, has almost ceased to supply any of it; fifteen or twenty years of ruthless tree slaughter having resulted in the extermination of the most valuable of the tribe, the *Cinchona Calisaya*. Mr. Markham struggled for days and days through the forest regions of Caravaya in search of this once common, though precious variety, without meeting with one specimen higher than six feet, the beautiful crests of brilliant foliage and sweet-smelling flowers that formerly overtopped the highest trees of the forest having long since disappeared. Bolivia appears to have been only slightly behind her neighbors in this suicidal work. The supplies of Calisaya bark from this country are rapidly being worked out. The Bolivian legislature has, however, from time to time endeavored to check the extinction of this branch of commerce by stringent legislative enactments, but the decrees have either not been rigidly enforced, or else they have been

abrogated. Dr. Weddell tells us that at the centre of what was formerly the chief bark-collecting district, the surrounding forests are now quite cleared of cinchona trees, and that it is necessary to seek them at a distance of ten or twelve days' journey from any inhabited locality. These facts are sufficient to show the amount of danger threatening the bark trade of South America. It must, however, be distinctly understood that the great peril does not consist so much in the total extirpation of the cinchona genus (for this would be beyond the power of even the most reckless of the *cascarilleros*), but in the indiscriminate destruction of all trees above the size of a small sapling. The number and size of the trees being thus diminished, the result will be the stoppage of the supplies during several years, and at frequent intervals, rendering quinine a still more costly luxury than it is at present, and quite beyond the reach of thousands, whose lives would be sacrificed from inability to secure it. To an ordinary observer the remedy for this state of things would seem to be stringent forest laws, backed by European capital and enterprise. But the unsettled state of these countries, and the impossibility of procuring adequate labor when required, present insurmountable difficulties. The consequences of a failure or even a diminution in the supply of quinine would result in the most disastrous consequences to the tropical possessions of the British Crown. It is not too much to say that our rule in India is built on cinchona bark, and a quinine famine in that country would be destructive to Europeans as the food famine was to the natives a short time since. Hence the incalculable importance of introducing the cinchona plant into India. For more than twenty years the late Dr. Royle and a host of other scientific men of eminence endeavored to render the British and Indian Governments alive to this great fact, but it was not until the matter was laid before that enlightened young statesman, Lord Stanley, in 1859, that any decisive steps were taken. An expedition was formed under the superintendence of Mr. Markham for the collection of cinchona plants and seeds of all the valuable species in South America, and for their introduction into India. The difficulties in the way of accomplishing this great work were simply almost insuperable; but the energy and determination of Mr.

Markham and his companions, Messrs. Spruce, Prichett, Cross, and Weir, overcame every obstacle, and there are now growing in the Neilgherry Hills and in other parts of India some 130,000 flourishing young cinchona plants of the most valuable species. The greatest possible discrimination had to be exercised with regard to the species to be collected, all the valuable kinds having been obtained, and the worthless sorts having to be rejected. It must also be remembered that the cinchona had never been cultivated, that its conditions of growth were undiscovered, and that it grows in forests scarcely ever visited by any European. These forests are approached by paths which skirt the edges of perpendicular precipices, and pass through regions of perpetual snow and bleak wilderness, destitute of all the resources needed by the traveller. To add to all this, the forests themselves are close masses of tangled fever-haunted vegetation, so closely matted that every foot of way had to be hewn out. These obstacles would surely have deterred less courageous men than Mr. Markham and his companions from prosecuting the objects of their search; but they endured more than these, for the inhabitants of the country put every conceivable difficulty in their way of finding cinchona localities. When once reached, the forests were found to be utterly denuded of cinchona-trees, nothing being left but a few inconspicuous shrubs, as easily discoverable as a needle in a bundle of hay. By March, 1862, the objects of the expedition were gained, and the whole of the plants and seeds were deposited in the Neilgherry Hills in Southern India, under the charge of Mr. McIvor and his able assistants. In addition to the above-mentioned plants and seeds, they also received six fine plants of *C. calisaya* from Sir W. Hooker, a specimen of *C. officinalis* from Mr. J. E. Howard, the eminent quinologist, besides several other specimens, including one of the species yielding the Cartagena bark of commerce from the Dutch plantations in Java. The kinds now growing in the Neilgherry Hills embrace all that are considered valuable in commerce. The success and well-being of the plantations in India are due entirely to Mr. McIvor, aided by the invaluable advice and information rendered by Mr. Markham and his coadjutors as to the nature of the habitat of the plants. The spots selected for the plantations were fixed on only after

much study and careful examination of soil, elevation, temperature, and general meteorological conditions. The sites chosen resemble as closely as possible in these respects those in South America in which the different species are found, the only fear at first being the amount of moisture natural to the district might not be sufficient for the requirements of the plants; but as they have weathered two very dry seasons, all anxiety on that score is at an end. During the first year the operations were confined to the propagation of the plants under glass; and owing to the great talent shown by Mr. McIvor in this branch of scientific botany, he has been able to increase his stock of plants from 8613, in January, 1862, to nearly 13,000 in January, 1863. The plants planted out in the open air are in a very flourishing condition, and cover 745 acres. The Government intends planting 150 acres annually for ten years with the plants grown in the propagating houses, besides which numbers have been sent to Darjeeling to form a nursery, to Travancore, to Ceylon, and to other parts of India. Mr. Markham then drew the grand distinction between mere transplantation and true cultivation, which consists not merely in imitating the surrounding circumstances of the plant in its wild condition, but also in removing the adverse influences which also act upon it in its native forests. The Dutch, in establishing cinchona plantations in Java, appear to have somewhat erred in this particular, by placing it in a forest under dense shade, forgetting that all forest plants necessarily suffer from want of light and air. The successful rearing and transplantation of the cinchonas having been attained, it remained to determine the way in which the harvests of bark should be secured; whether, in fact, they should be reared as bushy shrubs or tall trees. The former alternative was decided on; the cinchonas will therefore be treated as shrubs, the yearly harvest of bark being obtained by simply lopping and pruning, by which they will be rather benefited than injured. Mr. McIvor calculates that the plants will begin to yield quill bark when about six years old until their twelfth year, when a large proportion will be *plancha*, or flat bark. With regard to the amount of alkaloids yielded by the wild bark it is stated to be from three to five per cent. From the cultivated bark, when grown under every advantage that science and

practical experience can suggest, the yield ought to be greater. A microscopic portion of bark grown in the Neilgherries was lately submitted to Mr. J. E. Howard for analysis, and as far as so small a piece would enable him to do so, he obtained a satisfactory result. Mr. Markham then entered largely into the commercial advantages to be gained by the cultivation of the cinchona plants by private individuals, who can be supplied from the Government plantations at a merely nominal price. When it is considered that a pound of red bark may be produced for 3d. which will sell in the London market at from 2s. 6d. to 8s., there is every reason to think that men of business in India will not neglect so promising an investment. The lecturer concluded by enumerating the numerous advantages certain to result from the successful introduction of cinchona plants into India. It is well known that intermittent fever now makes fearful havoc amongst the natives of certain districts who are quite beyond the reach of the healing bark. There will be shortly no reason why the poorest ryot should not have a cinchona tree behind his hut, the green bark of which is, according to Dr. Poeppig, as excellent a remedy for fever as the extracted alkaloid. As an additional article of commerce it will of course be a valuable addition in a trade point of view, but from the benefits which the growth of the bark trees will confer on the native population, Mr. Markham prophesies that before many years they will be regarded as the sacred dwelling-places of the Indian gods of healing, Rishi and Aghastya.

During the discussion several interesting facts were mentioned by the various speakers.

The Chairman, Dr. Chambers, suggested that under proper cultivation many of the cinchonas now worthless might be made to yield as large a quantity of alkaloid as the best varieties. He also mentioned that many hospitals and dispensaries were unable to give quinine to their out-patients on account of its high price, so that a large portion of the poorer population were deprived of the use of this excellent drug.

Mr. J. E. Howard considered the Indian experiment to be a decided success, but warned commercial speculators against entering too rashly into schemes for cinchona cultivation. The very first thing to be considered was to procure the proper

species of trees, the best, in his opinion, being the *Calisaya* varieties. He then entered into particulars of influences of soil and locality on the production of different amounts of quinine by the same species, and concluded by passing a high eulogium on Mr. Markham and his companions.

Mr. S. L. Howard reminded the meeting that the salts of cinchonine, an alkaloid at one time thought to be as valuable as quinine, had been made the subject of experiment as febrifuges by several eminent medical men with great success, although many others were prejudiced against them. He thought it highly important that they should be tried as tonics and febrifuges both at home and in India, being much cheaper than the corresponding quinine compounds. He urged the necessity of proving absolutely their value or worthlessness at once, as the bark containing them could be readily procured while they were waiting for the Indian plantations to arrive at maturity.

Mr. P. L. Simmonds gave some interesting statistics of the bark and quinine trade. He also mentioned that the cinchona was in experimental cultivation in the Botanic Gardens, Jamaica, and expressed his surprise that France, Spain, and other countries having colonial possessions with suitable climate and elevations of country, had not turned their attention to its introduction.

Mr. Daniel Hanbury stated that the *C. condaminea* yielded as a shrub a *Loxa* bark exceedingly poor in alkaloids, while the broad tree bark was so rich as to give the almost worthless shrub bark now obtained a kind of hereditary reputation.

Mr. J. E. Howard, in reply, said that although this was the case with the bark of the *C. condaminea* it was almost the direct contrary with the *C. calisaya*, the species he so strongly recommended for cultivation in India, the small quills often yielding a higher percentage than the flat bark of the larger trees. He severely criticised the neglect of the Government in allowing Mr. Markham, with his valuable cargo, to find his way from Peru to India the best way he could, instead of sending a steamer to convey him from shore to shore. Many of the most valuable plants were irrecoverably lost to India through having perished on their way thither through the cold climate of Europe.

Dr. Seeman said that, knowing the cinchona districts as well as he did, he could better appreciate than describe the enormous difficulties Mr. Markham had surmounted, to whom the greatest honor was due for carrying out so well the noble purposes of the expedition.

A unanimous vote of thanks to Mr. Markham was carried with acclamation.—*Chem. News, Lond.* April 25, 1863.

AMERICAN PHARMACEUTICAL ASSOCIATION.

The Tenth Annual Meeting of the American Pharmaceutical Association will be held in the city of Baltimore, Maryland, on Tuesday, the 8th day of September, 1863, at three o'clock, P. M.

After taking counsel with members of the Executive Committee, and other prominent members of the Association in various parts of the country, and duly weighing an invitation to meet at Pittsburgh, it was determined to accept the prior official invitation of the Maryland College of Pharmacy. A meeting in Baltimore, it was thought, would be better attended at the present time than in any western location. In view of this decision, the members generally are earnestly invited to keep in memory the various interests of the Association, that should be developed at the Annual Meeting; the several standing Committees are encouraged to early prepare their reports, and those members who accepted subjects for investigation at the Philadelphia meeting last year, are particularly invited to have their papers ready, and, in the event of not attending the meeting, to forward them to the President of the Association, care of Andrews & Thompson, Pharmacists, Baltimore.

The objects of the Association are fully explained in Article 1st of the Constitution; the conditions of membership are in Article 2d. "Every pharmacist or druggist of good moral character and professional standing, whether in business on his own account, retired from business, or employed by another, who, after duly considering the objects of the Association, and the obligations of its Constitution, is willing to subscribe to them, is eligible to membership." Pharmacists and druggists desirous of membership, may obtain further information, and a copy of the Constitution, by applying to the Chairman of the Executive Committee, Edward Parrish, 800 Arch St., Philadelphia. All applications for membership should, when possible, be in the hands of the Executive Committee at the opening of the first session.

WILLIAM PROCTER, Jr., President.

Philadelphia, April 20th, 1863.

Editorial Department.

MEETING OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.—The aspect of the political horizon, though not favorable to our next meeting, will, we trust, become more encouraging long before that period arrives. The members will do well to proceed with their investigations and get their papers ready, so that when the meeting convenes, there will be something to engage its attention. We know how prone men are to be attracted from their ordinary duties by the occurrence of such events as are now happening near us, yet while prepared to do our duty as citizens, we should not forget that our duty as pharmaceutists is to sustain our National Association.

THE U. S. ARMY LABORATORY AT PHILADELPHIA.—Since our last notice of this enterprise of Surgeon-General Hammond's, we have twice visited the laboratory, where Dr. A. K. Smith, U. S. Army, the Director, and Prof. Maisch, the Chemist, politely showed us the several departments at present in operation. The Laboratory buildings are those formerly occupied by Crew, Rogers & Crew, for their chemical works, at Sixth and Oxford Sts. The main building has three stories, with a large one story building attached, and several detached structures for special purposes. All the heating in the main building is effected by steam, except such as is performed by gas burners. A twenty-five horse power engine, with appropriate boilers is erected in a position central to the laboratory operating rooms, and yet separate. Immediately above the boilers, and deriving its heat from them, is the drying room, which opens by a door into the mill or powdering room. In the latter there are at present two pairs of chasers, and one Bogardus' mill. Two more pairs of chasers are to be erected in a short time. Mr. Maisch informs us that he has succeeded in getting his bolting machine to operate very successfully. In this room is also the machine for making the preparations of *free* metallic mercury, as blue pills, mercurial ointment, etc., by shaking, as described and used by Dr. Squibb, except that the plan of the machine is more simple. In this room, all the fine powders, as ipecac, rhubarb, jalap, etc., are prepared, and sent up stairs to be bottled, whilst the chief occupation of the mill is in preparing drugs for percolation. Proceeding eastward from the mill room, the visitor enters the general operating room for Pharmaceutical and Chemical processes;

commencing with the percolators, which are adjacent to the mill room, the processes become more chemical towards the further end, the visitor can here witness the concentration of liquids on water baths, and in stills for fluid and solid extracts, preparations of morphia, and for the crystallization of salts. The preparation of the officinal solutions of ammonia, is conducted here also, but apart from the other processes.

The large percolators are constituted of wood, lined with tinned copper, varying in capacity from 260 gallons to 150 gallons. Besides these, vessels of smaller size, constructed of tinned iron, are in use for lesser operations. 280 pounds of colocynth, and 600 pounds of valerian are percolated at one operation. These wooden percolators are arranged on a stage, on a level with, and connected with the mill room, so as to be easily charged. Each percolator has a manhole in front near the bottom, closed by clamps and screws, through which the exhausted material is extracted after each operation. Hanging in front of each percolator is a black-board, on which is written the leading facts of each operation as they are developed, such as name and quantity of material, menstruum, and percolate, with remarks when necessary. Along the eastern end, a range of jacketted steam evaporators are in operation and jacketted stills. In a detached brick building, on the north side of the lot is the room for furnace operations, including the preparation of oil of wine, which will be made in eight gallon retorts, on sand baths. Here the oxidation and solution of metals, and numerous other operations involving direct heat, will be conducted. In the centre of the area, a building is being constructed specially for the manufacture and bottling of ether, sweet spirits of nitre, and chloroform, with a subterranean store-room. Steam heat only will be used, and no light or fire of any kind allowed in the building. The apparatus for ether will be that of Dr. Squibb, described before in this Journal. By thus isolating these articles, much of the usual danger of fire will be avoided. Ample space remains in the yard for extending the buildings if required.

Returning to the main building, we find the storekeeper's room next to the mill room on the first floor, and north of this, other rooms, among which are the office and Mr. Maisch's private analytical laboratory, neatly fitted up with apparatus needed in the examination of drugs and chemicals previous to their purchase, when required. On the second floor north is the sewing machine room, in which twelve girls and a cutter, operating ten sewing machines, make one thousand linen sheets daily, and pillow cases, towels, and other items required in the army hospitals. On the opposite end of the building is the filling room, where all powders, salts, pills, and other dry substances are put up in bottles for the medicine chests; and in a similar room directly above this all the various fluid extracts, tinctures, and other liquids are bottled and labelled, each kind put up by itself on shelves for temporary storage, above the counter. The work in these two rooms occupy twelve girls, besides six others engaged in washing the bottles. In the *pill* room, four girls are engaged in making

pills. At present the common pill machine only is employed, the composition and formation of the mass is superintended by a Graduate in Pharmacy. The pills made are pil. opii, pil. cathart., comp. and pil. hydrarg., U. S. P; and pil. camphoræ et opii, pil. coleynth comp. et ipecac, and pil. quiniae sulph. *aa* 3 grs.

It should be understood that the medical supply table for the army is by no means so comprehensive as the Pharmacopœia, and consequently the scope of operations is confined chiefly to those preparations on the list. It is intended to make Ceratum Simp., Cantharidis, and Resinæ, and, as soon as arrangements can be made, to spread adhesive plaster and isinglass plaster for the entire army. Morphia will also be made to an extent adequate to the wants of the whole army. It has been determined to manufacture sulphate of quinia, and soon as the bark arrives this will be commenced, and the experiment of its economy made. About two hundred serons of Cinchona have been purchased.

The basement of the main building is paved with brick throughout, and is used for storing and bottling liquors, and fixed oils. Three girls attend to the bottling of liquors. The medical store wagons and panniers are filled at the laboratory, but made elsewhere. The bottles used are all marked in the moulding "U. S. A. Hosp. Dep." and are furnished from Pittsburgh. Each bottle of any size is enclosed in a square pasteboard box surrounded with sawdust or rice husks, and these closely packed in wooden boxes appropriately marked, and then conveyed to the storehouse at Sixth and Master Streets.

All drugs are purchased on the requisition of the Director, Dr. Smith, by an order from the medical purveyor (Dr. Robert Murray, U. S. A.) to a drug broker, it being clearly understood that all purchases are subject to the inspection and analysis of Mr. Maisch.

Such is a hasty view of this new enterprise. So far, we are informed, on many leading articles great economy has attended the experiments, and all has been well done. In the sewing machine department, since operations commenced, Dr. Smith says that they have paid for the machines, and saved the Government \$1200 besides! Of course it will take a longer period to determine the actual facts of the case, but there can be but little doubt of the expediency of the measure, whilst the necessity for large supplies exists, and under the care of such earnest workers as Dr. A. K. Smith and Prof. Maisch it will receive a fair trial.

U. S. PHARMACOPÆIA.—We had hoped to have been able to present a notice of this work, which would have been published ere this, but for an expected delay of two weeks, arising out of the necessity of getting type made for expressing the accentuation in the index, as directed by the Convention at Washington. The Chairman of the Committee having objected to the appearance of any notice prior to publication, we are compelled to

postpone any commentary on the *Pharmacopœia* until our September issue. Meanwhile we have every reason to believe that the book will be published about the middle of July.

THE BRITISH PHARMACOPŒIA.—Through the *Pharmaceutical Journal* for May, page 552, we learn that the publication of this work is now retarded by the vexatious labor arising from the reconversion of the weights, in the formulae, to troy weight value. Dr. Burrows gave a discouraging account of the difficulties surrounding the process due to the action of three distinct Sub-Committees located in London, Edinburgh, and Dublin, “giving rise to interminable alterations, suggestions, recommendations, joinders, rejoinders, replications, and so on. Dr. Farre, of the Committee, was *more hopeful*, and seemed to think there was a chance of the work being published during the present generation! When it is remembered that the British *Pharmacopœia* was commenced in 1857, it should make our own critics more charitable towards the presumed shortcomings of our own *Pharmacopœia Committee*.

WEIGHTS AND MEASURES IN ENGLAND.—Some of our English friends have a strong hankering after a decimal system of weights and measures. A Committee of Parliament has for some time been engaged in making “a full investigation of the regulations of different countries, as well as the requirements of our own country, [Great Britain,] and have arrived at the conclusion that a universal system should prevail among commercial nations, and that the French Metrical System was the best suited for general adoption.” A bill is now before Parliament designed to carry out the recommendation of the Committee, which bill is printed in *extenso* in the June number of the *Pharmaceutical Journal*, just received. This bill makes all the measures dependant upon the metre, which it calls the “new yard” (39-37079 inches) or unit of length measure. The unit of surface measure is the square metre. The unit of measure of capacity is the litre or new quart (a cube of the one-tenth of the new yard.)

The unit of weight is the weight of a *new quart* or litre of distilled water, to be called a “kilogram,” the half of which is to be the new pound. The one-thousandth of the kilogram will be called a “gram,” which in decimal parts and multiples, “shall be used for weighing bullion and precious stones, and for the purposes of pharmacy.”

The bill makes the use of these measures legal, three months after it becomes a law; and at the expiration of three years from that time, it shall be illegal to use any other weights or measures within the realm of Great Britain. The subject may now be considered to be open to the British public. The characteristic deliberation with which great changes are effected in England, will give ample time for the people to consider

the matter, yet it is not probable that one in ten thousand of the population will understand the merits of the bill or appreciate the amount of disturbance it will create in commercial transactions. With a just appreciation of the advantages of the decimal system in regard to multiples of the units, we yet believe the duodecimal or sexdecimal system to be far more convenient in practice, and that should the decimal system be adopted in England, it will be virtually annulled in practice, as regards the decimal fractions, by the retention of the custom of halves, quarters, eighths and sixteenths of the kilogram, using them in lieu of the present fractions of the avoirdupois pound,—in fact, the bill foreshadows this in its 5th clause, which says, “For the more convenient subdivision of weights and measures, it shall be lawful to use the double and the half of all the said units, and their principal decimal divisions and multiples, *as well as any other subordinate divisions* which the Committee of the privy council for trade *may deem expedient.*”

PROVINCIAL PHARMACY IN ENGLAND.—The working of the Pharmaceutical Society of Great Britain has long been an object of interest with some in this country. Centralization is its most prominent feature. Whilst four-fifths of its members are “provincial,” (that is, reside out of London,) nearly the whole operations of the Society are transacted in London. In a profession, the members of which are so tied to locality as are ours, it is not to be wondered at that many able and reflecting provincial pharmacists in England feel dissatisfied with the practical working of the Society. Large sums are spent, of which they can only enjoy the fruits by going up to London. Arising out of this feeling, we find in the May number of the Pharmaceutical Journal, a paper on systematic scientific inquiry, by M. Reynolds, of Leeds. In looking around for examples of the working of national societies, he directs the attention of his readers to the “American Pharmaceutical Association,” as offering some features worthy of adoption, and refers to the volume of its Proceedings for 1859, as evidence of the advantages of the Association. The chief points aimed at by Mr. Reynolds are, 1st—to have the annual meetings of the Pharmaceutical Society held in rotation among the principal cities of Great Britain; and 2d, to adopt those features of the British Association, and the American Pharmaceutical Association, by which these bodies pursue scientific inquiry in a systematic manner, through committees and individuals, appointed annually. We believe that the engraftment of these branches into that society would effect a great revolution in the status of English “provincial” pharmacists, and bring to bear an amount of latent ability now only needing the stimulus arising from having a distinct part to play, that will raise the scientific level of English Pharmacy far above its present average. In the United States, the most decided local advantages have arisen from simply holding an annual meeting. In Baltimore, previously

to the last meeting held there, the Maryland College of Pharmacy had almost ceased to exist. Under the stimulus of the then prospective meeting in that city, that institution was revived, a school of Pharmacy and a Journal established, and the condition of Pharmacy in that city was permanently benefitted. So of England and Scotland. Let it be known that in June, 1864, the annual meeting will be held in Liverpool, it will be found that the Pharmaceutical chemists of that city will inaugurate movements involving neighboring towns that will be fraught with permanent advantages. Let every fifth meeting be in London, and the others according to adjournment. Let the annual meeting become a scientific gathering, as well as one for the discussion of the operation of its by-laws, and depend upon it English Pharmacy will rise more rapidly than yet has been the case.

LIABILITY OF DRUGGISTS.—A curious case has been recently reported in the Cincinnati *Lance*, for May, 1863, detailing the legal proceedings in regard to an explosion resulting from a mixture of substances ordered at a drug store in Bellefontaine, Ohio.

The plaintiff, Joseph W. Kerr, filed a petition on the 5th of October, 1861, setting forth that the defendant, Thomas S. Clason, kept an apothecary shop in Bellefontaine, Ohio, and that on the 8th day of November, A. D. 1860, at the place aforesaid, without fault or negligence on the part of plaintiff, by his unskillful and careless servant did certain injuries to the plaintiff (as specified in the petition), causing him great personal damage and expense from sickness,—for which the plaintiff asked judgment against the defendant for \$10,000.

The defendant then entered a demurrer, setting forth that the plaintiff had not shown sufficient cause for action, etc.

The Court decided against the demurrer, and referred the case to the next term; meanwhile, it was compromised.

The following statement of the facts of the case was furnished by the Hon. Wm. Lawrence, of Bellefontaine, O., before whom the case was brought:

"**EDITOR'S LANCET AND OBSERVER:**—In the September number, 1862, of the *Western Law Monthly*, published at Cleveland, is the report of a case decided by the Court of Common Pleas of Logan County, Ohio. It is *Thomas W. Kerr vs. Joseph S. Clason*, page 488, and involves somewhat the duties and liabilities of druggists and physicians. As this case, which was pending in my court, is now compromised, it may be a matter of interest to the medical profession to know the facts of the case. They are these:

James Wallace, of Ridgeway, sent a written prescription to the drug-store of Dr. J. S. Clason, here, to be filled, which was in substance as follows:

One quart spirits turpentine,
Four ounces British oil,
Four ounces oil of spike,
Four table-spoonfuls of nitric acid.

On the 8th of November, 1860, Jonathan McCormick, a clerk in the drug-store, filled in these ingredients in a three-pound bottle, in the order above stated. It stood in the bottle nearly ten minutes, when he corked it. He then picked it up, gave it a shake, when the cork flew out, followed by a stream of fire, exploding with a loud noise and great violence. Strange as it may seem, the bottle did not break. When the contents had about half blown out of the bottle, McCormick set it down on the floor or counter. This was in the back end of the store room, say twenty-seven feet from the front end. The show windows, with bottles, etc., in the front end of the room were blown out, and glass driven into an oak post twelve feet from the windows, perhaps one-third of an inch deep. The room was filled with flame similar to a powder flash. Persons up stairs felt the shock, and say the floor was jarred up so as to rise partially. Mr. Kerr, who was standing near the bottle, say four feet from it, was covered with flame, ran out, his clothing on fire, and was sadly burned. His fingers came off his right hand. It is supposed the neck of the bottle was accidentally pointed at him. McCormick was seriously burned. The little boy, also near, was enveloped in flame, and his clothes considerably burned. All the parties recovered,—Mr. Kerr sadly disfigured. McCormick's coat, pants and vest, all of strong goods, were torn into tatters, yet did not take fire, nor was any violence done to his body seriously, though shocked and burned on his hands and face all over. The nitric acid used was "Commercial nitric acid;" the turpentine, common ordinary article. Dr. Clason thinks McCormick used sulphuric acid instead of nitric acid, as stated by McCormick. The latter, however, asserts that it was nitric acid.

This is written and approved by McCormick and Dr. Clason. McCormick says he believes if the bottle had not been corked and shaken it would not have exploded. No bottles on the shelves were broken. Wall paper in the store in rolls for sale was burned considerably, and some articles on shelves where the contents of the bottle flew were burned. The articles were all put in without shaking. Dr. Clason says he has very strict evidence that *it was sulphuric acid* that was put in, and not nitric acid—and I have no doubt this is the fact."

According to the statement, it is a matter of doubt whether SO_3 or NO_3 was used; in either case the acid would, in weighing out the ingredients, assume the lower stratum. The subsequent reaction, brought on by agitation, would be very much influenced by the nature and strength of the acid used. To produce the effects indicated, either the heat must have been sufficiently great to vaporize the turpentine, so as to form an explosive mixture with the air of the room, or gases of an explosive nature were eliminated and subsequently ignited. The season of the year would require the front door closed, and, under these circumstances, a very moderate sudden expansion of the atmosphere of the store would force out the bulk windows easily. The case is worth a chemical inquiry.

NATIONAL ACADEMY OF SCIENCES.—One of the last Acts of the Thirty-seventh Congress, was the incorporation of a body under the title of the "National Academy of Sciences." The following is a copy of the Act:—*viz.*

"Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, That Louis Agassiz,

Massachusetts ; J. H. Alexander, Maryland ; S. Alexander, New Jersey ; A. D. Bache, at large ; F. A. B. Barnard, at large ; J. G. Barnard, U. S. Army, Massachusetts ; W. H. C. Bartlett, U. S. Military Academy, Missouri ; U. A. Boyden, Massachusetts ; Alexis Caswell, Rhode Island ; Wm. Chauvenet, Missouri ; J. H. C. Coffin, U. S. Naval Academy, Maine ; J. A. Dahlgren, U. S. Navy, Pennsylvania ; J. D. Dana, Connecticut ; Charles H. Davis, U. S. Navy, Massachusetts ; George Engleman, St. Louis, Mo. ; J. F. Frazer, Pennsylvania, Wolcott Gibbs, New York ; J. M. Gillis, U. S. Naval Observatory, Kentucky ; A. A. Gould, Massachusetts ; B. A. Gould, Massachusetts ; Asa Gray, Massachusetts ; A. Guyot, New Jersey ; James Hall, New York ; Joseph Henry, at large ; J. E. Hilgard, at large, Illinois ; Edward Hitchcock, Massachusetts ; J. S. Hubbard, U. S. Naval Observatory, Connecticut ; A. A. Humphreys, U. S. Army, Pennsylvania ; J. L. Le Conte, U. S. Army, Pennsylvania ; J. Leidy, Pennsylvania ; J. P. Lesley, Pennsylvania ; M F. Longstreth, Pennsylvania ; D. H. Mahan, U. S. Military Academy, Virginia ; J. S. Newberry, Ohio ; H. A. Newton, Connecticut ; Benjamin Pierce, Massachusetts ; John Rodgers, U. S. Navy, Indiana ; Fairman Rogers, Pennsylvania ; R. E. Rogers, Pennsylvania ; W. B. Rogers, Massachusetts ; L. M. Rutherford, New York ; Joseph Saxton, at large ; Benjamin Silliman, Connecticut ; Benjamin Silliman, Jr., Connecticut ; Theodore Strong, New Jersey ; John Torrey, New York ; J. G. Totten, U. S. Army, Connecticut ; Joseph Winlock, U. S. Nautical Almanac, Kentucky ; Jeffries Wyman, Massachusetts ; J. D. Whitney, California, their associates and successors, duly chosen, are hereby incorporated, constituted and declared to be a body corporate by the name of the 'National Academy of Sciences.'

" Sec. 2. *And be it further enacted*, That the National Academy of Sciences shall consist of not more than fifty ordinary members, and the said corporation, hereby constituted, shall have power to make its own organization, including its Constitution, by-laws, and rules and regulations ; to fill all vacancies created by death, resignation, or otherwise ; to provide for the election of foreign and domestic members, the division into classes, and all other matters needful or usual in such institutions, and to report the same to Congress.

" Sec. 3. *And be it further enacted*, That the National Academy of Sciences shall hold an annual meeting at such place in the United States as may be designated, and the Academy shall, whenever called upon by any Department of the Government, investigate, examine, experiment, and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments and reports, to be paid from appropriations which may be made for the purpose, but the Academy shall receive no compensation for any services to the Government of the United States."

According to the Druggist's Circular, June, 1863, the first meeting of this body was held in the Chapel of the University of New York, on the 22d of April, 1863. 'The Hon. Henry Wilson, of Massachusetts, (through whose exertions mainly the bill was passed,) called the meeting to order in a brief but pertinent address. Prof. Joseph Henry, of Washington, was elected *pro-tem.* President of the meeting, and Prof. Caswell, of Providence, Secretary. The meeting then passed the following resolution :

" *Resolved*, That the Academy accept the Act of Incorporation, and hereby declares its intention of entering with earnestness and devotion upon the high course marked out for it by Congress."

The plan of organization adopted was in the main, as follows:

1. The class of Mathematics and Physics.
2. The class of Natural History.

The corporate members elect under which of these two classes, and in which section of that class, they will inscribe their names. The classes are subdivided thus:

A. CLASS OF MATHEMATICS AND PHYSICS.—Sections 1. Mathematics; 2. Physics; 3. Astronomy, Geography, and Geodesy; 4. Mechanics; 5. Chemistry.

B. CLASS OF NATURAL HISTORY.—Sections 1. Mineralogy and Geology; 2. Zoology; 3. Botany; 4. Anatomy and Physiology; 5. Ethnology.

While each member chooses his own position, he may also be elected an honorary member of any section by the members thereof, and the Academy retains the power of transferring a member from one section to another.

There may be fifty foreign associates who take no part in the business of the Academy, but have the privilege of attending its sessions, reading and communicating papers, and of receiving a copy of the publications of the Academy.

The officers of the Academy are a President, a Vice-President, a Foreign Secretary, a Home Secretary, and a Treasurer, all of whom are elected for a term of six years.

There is also a Chairman and Secretary to each class, elected annually at each January meeting. The officers of the Academy, and Chairman of the classes, together with four members to be annually elected by the Academy, constitute a Council for the transaction of such business as is assigned to them by law or by the Academy.

The powers of the President, (or, in case of his absence or disability, the Vice-President,) are to preside at the meetings of the Academy, name (unless otherwise provided by law) Committees of members, referring business, experimental inquiries, investigations or preliminary inquiries required by the Government of the United States or its branches, to members specially conversant with the subject; and, with the council, to direct the general business of the Academy. The duties of the other officers present nothing beyond what is usual in all similar organizations.

The Academy holds two stated meetings in each year—one in January and one in August. The January meeting is to be held always in Washington, on the third day of January, (or when that day is a Sunday, on the 4th;) but the August meeting will be held at such place as the Academy at any previous meeting may designate, and on the third Wednesday of the month. The scientific meetings of the Academy are to be open or public, the business meetings closed. Communications by persons not members of the Academy are to be presented and read by a member, who makes himself responsible only for the general propriety of the paper, and not for opinions expressed by the author.

Propositions for researches, experiments, observations, investigations, or reports, shall originate with the classes to which the subjects are appropriate, and then to be submitted to the Academy for discussion, and approval or rejection, excepting propositions from the Government of the United States, or any of its branches, which shall be acted on by the President, who will, in all such cases, report, if necessary, at once to the Government, and also to the Academy at the next stated meeting. The judgment of the Academy is to be at all times at the disposition of the Government upon any matter of science or art within the limits of the

subjects embraced by it. The President of the Academy is competent, in special cases, to call in the aid, upon committees, of experts, or men of remarkable attainments not members of the Academy.

The annual report to be presented to both Houses of Congress is to be prepared by the President of the Academy, and before its presentation is to be submitted, first to the Council, and then to the Academy, at the January meeting. The abstract of a memoir may be sent by any member to the Home Secretary, to be printed and circulated among the members during the recess of the Academy.

These are the most important features of the organic law of the National Academy of Science. An election was held under the rules, when the following officers were chosen almost unanimously :

President—Alexander Dallas Bache, Washington, D. C.

VicePresident—James D. Dana, New Haven, Conn.

Foreign Secretary—Louis Agassiz, Cambridge, Mass.

Home Secretary—Wolcott Gibbs, New York,

Treasurer—Fairman Rogers, Philadelphia, Penn.

OFFICERS OF THE CLASSES.

Class A, Mathematics and Physics—Chairman, B. Pierce, Cambridge, Mass.; Secretary, B. A. Gould, Cambridge, Mass.

Class B, Natural History—Chairman, B. Silliman, New Haven, Conn.; Secretary, J. S. Newberry, Ohio.

Representatives in Council—Admiral C. H. Davis, Lewis M. Rutherford, Dr. John Torrey, Prof. J. P. Lesley.

After the completion of the organization, each member present, agreeably to the requirements of the organic law, took the oath of allegiance prescribed by the Senate of the United States for its own members, and in addition thereto took an oath faithfully to discharge the duties of a member of the National Academy of Sciences to the best of his ability.

The President then read a letter from the Secretary of the Treasury, asking the Academy to prepare a report on the subject of Weights, Measures, and Coinage, both domestic and international. A resolution of thanks to Chancellor Ferris, for the use of the rooms in the University Building, was passed unanimously, and the Academy adjourned to meet in the city of Washington on the 3d day of January, 1864.

LA SOCIEDAD DE FARMACIA, NACIONAL ARGENTINA. ARGENTINE PHARMACEUTICAL SOCIETY.—By a letter to the Editor, dated Buenos Ayres, April 26th, from Mr. Charles Murray, Secretary of the Pharmaceutical Society at that place, we learn that the name of that Institution has been changed to that of "Argentine Pharmaceutical Society" in consequence of its having recently been nationalized by the President of the Republic. After some remarks relative to personal matters, the author observes as follows:

"I am happy to see that your Society has the same object in view as ours, that is to say, to make Pharmacy what it ought to be, and what it is in France. Although Buenos Ayres is not much known, it has, nevertheless,

highly progressive ideas, especially in relation to the learned professions. A physician has to study six years, besides being a B. A. of our University; and a *Pharmacien* (I use this word advisedly) besides being a B. A., has to study two years Chemistry, one year Physics, and one of *Materia Medica*. I have lately presented a project of an *Ecole de Pharmacie* to our Society, which has been approved of, and we have presented it to the national government. We are pretty sure of it being approved of, as the Minister of the Interior says he will do all in his power to forward it.

In this project we demand for the candidate who presents himself for examination, to furnish proofs of having passed examinations in two years of Latin, two years of Mathematics, one of Physics, two of Chemistry, one of Natural History applied to Pharmacy, and one of Pharmacology. If he passes the two general examinations, we deliver to him the diploma of *Licentiate in Pharmacy*. Bye-and-bye I intend to demand the *Doctorate* for those who are willing to try for it, after having received their diploma of *Licentiate*, and I hope it will be given to us, as I believe we have just as good a right to the title of *doctor* as the M. D.'s."

By the same conveyance was received the April number of "*Revista Farmaceutica*," and two copies of "*Reglamento de la Sociedad de Farmacia Nacional Arjentina*."

A Practical Hand-book of Medical Chemistry. By John E. Bowman, F.C.S., former Professor of Practical Chemistry in King's College, London. Edited by Charles L. Bloxham. Third American, from the fourth and revised London Edition, with illustrations. Philadelphia. Blanchard & Lea. 1863. pp. 351. Duodecimo.

The publishers have done good service to the medical profession in bringing out this new American edition, so soon after the fourth and much improved English. In fact, seven years had elapsed since the previous revision in England, in which period many improvements and discoveries have been made, which will be here found. The author has confined the work to subjects of practical utility and professional interest most needed in the practice of medicine. The chemistry of the blood, urine, bile, and other animal fluids, occupy the chief part of the book, which concludes with the detection of poisons in organic mixtures, in which the new process of *dialysis* is practically applied. The novelty of this process induces us to give a place to the chapter as a sample of the editor's style, as well as for its merit.

Separation of Poisons from Organic Mixtures by Dialysis.

The important observation made by Mr. Graham that crystallizable bodies will pass in a state of solution through membranous and other diaphragms which will not permit the passage of the amorphous substances composing the bulk of most organic mixtures, has been applied by him to the separation of poisons. As the process is very simple, easy

of execution, and does not involve any operations, which would interfere with the subsequent application to the same mixture of any other process for the separation of the poison, it will probably come into very general use in medico-legal investigations.

This process is, indeed, a refined filtration, and is applicable instead of that operation, in all the steps of the separation of poisons from organic mixtures, with this very great advantage, that it removes not only substances mechanically suspended in the liquid, as is the case with filtration, but also coloring matters, albuminous substances, &c., which so interfere with the application of tests to the liquid obtained by filtration.

A circular piece of parchment-paper* is folded, as in preparing a filter, into a cone, which should be at least twice as large as is necessary to contain the mixture under examination. This cone is placed in the mouth of a cylindrical jar (see Fig.), (a beaker or common tumbler), filled nearly to the brim with water, the volume of which should be about eight times that of the organic mixture.

The solid portion of the organic matter having been cut up, and, if it be thought necessary, a little water having added to thin the mixture, it may be poured at once upon the cone of parchment-paper arranged as above directed. The whole may then be covered with a bell-glass, or placed in a secure cupboard, and left for as long a period as can be conveniently allowed to elapse, if possible, for at least forty-eight hours.

The *diffusate*, as the liquid in the glass is termed, may then be evaporated to a small bulk and examined for the poison by the appropriate methods, whilst the organic mixture remaining upon the cone or *dialyser* may be subjected to the ordinary processes for the separation of poison from organic matter.

Of course, in cases where there is reason to suspect the presence of hydrocyanic acid, alcohol, or phosphorus, it would not be prudent to subject the mixture to dialysis until at least a portion of it had been examined for those poisons.

If time could be spared, it would evidently be desirable to dialyse the organic mixture at first without any addition (except water), since not only would all questions of impurity in the reagents be avoided, but a knowledge of the state of the poison, whether soluble or not, would be thus gained, which might, in many cases, prove of great service. The mixture might then be dialysed a second time after digestion with the proper solvent, such as hydrochloric acid, or that acid with the addition of chlorate of potash.[†]

* This should have been well soaked in distilled water, and dried before use.

† The Editor has obtained most satisfactory results by this process in separating arsenious acid, strychnine, morphine, opium, and oxalic acid (as oxalate of lime). The arsenious acid was separated in some cases by simply dialysing the organic mixture, in others by digesting with hydrochloric acid and dialysing, and in others by first digesting with hydrochloric acid and chlorate of potash. In all cases the diffusate was colorless.

